NOV 2 . 1942

ENGINEERING NEWS-RECORD

NOVEMBER 19, 1942

OCKS BUILT UNDER WATER
DED FRAMES SAVE STEEL
E CONSERVATION METHODS
B MILL-BUILDING DESIGNS

★

s of glass-beaded cloth attached to curbs poles in Philadelphia will facilitate traffic trol during blackouts.—See p. 84

UNIVERSITY OF MICHIGAN
GENERAL LIBRARY
ANN ARBOR MICH

~~BUSINESS AS USUAL~~ war comes first!

We are not doing business as usual. But even if you don't have a high priority perhaps we can help in many ways.

The new ARMCO Emergency Pipe may be the solution to your drainage problems. It goes "all out" in meeting the War Production Board's requirements for substituting less critical materials wherever possible. This wood pipe is easy to handle and has strength to meet engineering requirements.

Remember that ARMCO Drainage Products—Corrugated Metal Pipe, Retaining Walls, Multi Plate, Sheeting, Perforated Pipe, Tunnel Liner — are only on temporary "leave of absence." They will all be back with flexible corrugated strength, ease of handling, tight joints and low installation costs.

Meanwhile, perhaps we can assist with your drainage problems. We may have just the answer in the use of non-strategic materials, or suggestions for repairing and salvaging older structures. Our 38 years of drainage experience is at your disposal. Write us. Armco Drainage Products Association, 1075 Curtis St., Middletown, Ohio.

ARMCO

ARMCO DRAINAGE PRODUCTS

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads

McGRAW-HILL PUBLISHING COMPANY, INC.

Publication Office: 99-129 North Broadway, Albany, N. Y. • Editorial and Executive Offices: 330 West 42nd Street, New York

JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON**, *Manager*

Vol. 129 NOVEMBER 19, 1942 No. 21

COMING NEXT

- **Establishing Grades** on Airfields—**A timely article that** proposes a **simplified method for preparing** an isometric grade chart. Computations are reduced to a minimum and adjustments to save excavation can be made largely on the basis of visible inspection of the chart. Field methods for laying out runway intersections by the same system are given.

- The growing prospect of an acute lumber shortage makes it imperative that conservation be practiced wherever possible. In an article, "Designing Rigid Frames of Timber", the author points the way to large lumber savings. Tables to permit rapid design of timber members are made available, and a typical problem is analyzed step by step, including design of the joints.

- Scarcity of asphaltic products, due to wartime restrictions, has deprived many highway departments of materials commonly used for the maintenance of road surfaces. Consequently, extensive use of various tars has become necessary. The basic characteristics of such tars, improved methods of application and other valuable data are included in an article on, "ABC's of Road Maintenance With Tars". Manufacturers standards are summarized in tabular form.

LOOKING AHEAD

- **"Keeping 'Em Running," might well be the title of a forthcoming article, which deals with one of the** biggest problems facing the construction industry today—maintenance, repair and rebuilding of equipment. This story outlines a comprehensive program designed to keep 6,000 pieces of equipment, (from the smallest motor to the largest construction machinery) operating at top speed.

- Largest single road job of the war period, other than the Alcan Highway and the work in Central America, is Michigan's industrial expressway which is designed to speed motor vehicle movements between the war plants of the Detroit industrial area. Ultimately it will form the Detroit end of an express highway to Chicago. Details of the highway and of its interesting structures will be given in an early issue.

PAGE

The Week's Events 51

Reader Comment 58

Editorials 60

Curved Box Girders for Highway Overpass 62

Welded Frames Cut Cost and Save Steel 64

Twin Drydocks Constructed Under Water 66

Proper Use and Conservation of Rope 74

Garbage Disposal at Sacramento 76

Wartime Maintenance of Facilities for Sewage Disposal 77

Mastic Used to Seal Leaky Brick Walls 80

Oregon Highways Open Rugged Country 82

Glass-Beaded Paint for Blackout Traffic Control 84

Amounts of Steel Required for Steel Mill Buildings 86

Notes on the Public Works Congress 93

From Field and Office 96

Unit Prices 98

New Aids to the Constructor 102

Manufacturers' Activities 110

New Manuufacturers' Publications 124

Men and Jobs 128

Meetings 130

Trends in the News 138

Construction Reports 149

Number of copies of this issue printed: 37,866

THE HAND ON THE JOB
is worth two in a sling

We're helping to
SMASH
industrial
accidents
and increase
production
with
LIGHT
FROM FLOORS

Man-day losses on the home front reduced and production increased by better light from white cement floors

52,000 KILLED! 4,100,000 INJURED! 500,000,000 man-days of work LOST! Right here on the home front. That is estimated toll of industrial accidents in this war year.

What can industry do about it? How can this industrial casualty list be cut down, thereby increasing production? Here is a new and tested idea—light-reflecting floors.

White cement floors are helping to reduce accidents and man-day losses in some of the nation's most important war plants. Giant reflectors of light, these floors greatly increase illumination, particularly on the under side and on vertical work surfaces. Dark, gloomy work areas disappear. Machines are more easily, more accurately operated. Employees work faster because they see better. And better light improves morale, encourages cleanliness, and above all promotes *safety*. For example, studies show that adequate illumination cuts accidents up to 25%.

What about the floors in your plant? Do they reflect light? They can! Light-reflecting floors made with Atlas White cement may be used to retop old floors as well as for new construction. First cost in terms of benefits are low, and maintenance is simple. Get the details now.

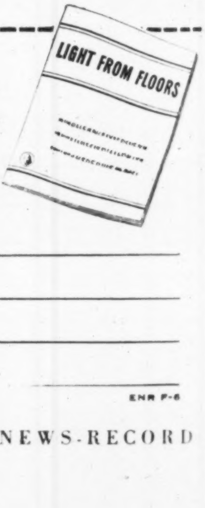
OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

Send for new booklet, "LIGHT FROM FLOORS," that tells the whole story. It's free. Contains cost figures, case study, photos, and technical data on construction. Mail the coupon today.

LIGHT-REFLECTING FLOORS
MADE WITH
ATLAS WHITE CEMENT

Universal Atlas
Cement Company
Chrysler Building,
New York, N. Y.

Please send me copy of new book, "Light from Floors."



Name____________________

Position____________________

Company____________________

Address____________________

ENR F-6

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • NOVEMBER 19, 1942 • VOLUME 129 • NUMBER 21

WLB order clarifies status of construction worker pay

Order 13 clarifies relationship with Wage Adjustment Board, but problems of multiple jurisdiction remain. Non-federal construction workers' pay not affected

The status of construction wages under the government's wage and salary stabilization program was clarified somewhat last week when the War Labor Board, which has been charged with control over voluntary wage increases, issued its General Order No. 13, establishing its relationship with the Wage Adjustment Board of the Department of Labor (*ENR*, May 28, p. 879).

The Wage Adjustment Board administers an agreement between the AFL building trades and federal construction agencies that freezes wages on federal jobs at July 1 levels, except as changes are approved by the board.

For purposes of wage regulation, construction jobs at present fall into several distinct groups. Wages on Army and Navy construction jobs are fixed at the July 1 level and fall under the jurisdiction of the Wage Adjustment Board. The new Order 13 provides that any wage increases approved by the board must be transmitted to the WLB. If WLB does not object within seven days, the board order is considered to be approved. If it objects, WLB may refer the decision back to the board for further study or go into the matter itself.

Wages on other federal work initiated before Nov. 5 fall into this same class.

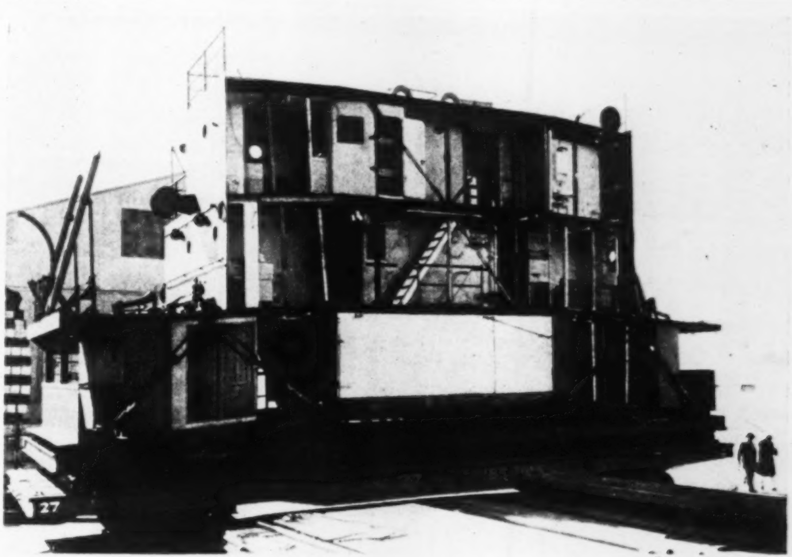
Non-federal work started before Nov. 5 does not fall under the jurisdiction of the Wage Adjustment Board. The only regulation of wages on such work is provided by the general order freezing all wages as of September 15 except as increases may be approved by WLB. Whenever an increase is to be granted in this category, application for approval must be submitted to the nearest office of the Wage-Hour Administration. These offices are functioning as field offices for WLB.

All work started subsequent to Nov. 5, unless it is for the armed services, is subject to multiple jurisdiction. Such work is subject to OPA Price Regulation 251 (*ENR*, Nov. 5, p. 613), which, in effect, freezes wages at the July 1 level unless an exemption is granted by OPA. They are also subject to the Sept. 15 freeze administered by WLB. And federal jobs in this group are subject to the Labor Department Wage Adjustment Board.

Until agreements are worked out by which some of these agencies will recognize the findings of the others, a wage increase on a federal civilian job would have to obtain three separate approvals.

Only in the case of a government job, indeed, can OPA approval be obtained at all. Regulation 251 provides for adjustments in the case of government contracts on a showing the regulation is impeding production. As regards non-governmental work there is no provision for adjustment.

Meanwhile, the War Labor Board moved last week toward assuming jurisdiction over labor disputes between municipal governments and their employees. A preliminary finding by a WLB panel recommended that the city of Newark, N. J., be ordered to reinstate 65 city employees who were fired after a recent strike called by the CIO State, County, and Municipal Workers. This panel finding will now go before the WLB itself for a final determination as to whether it will take jurisdiction.



Press Assn. Photo

Launch freighter in less than 5 days

The Kaiser shipbuilding yard at Richmond, Cal. recently broke all established records for production of shipping, and overran its own announced goal when it launched the 10,500-ton freighter Robert E. Peary, 91 percent complete in four days, 15½ hours. The previous record for a ship of this type was established by another Kaiser yard (ENR Oct. 1, p. 451).

The photograph above shows how the job was done. A complete section of the deckhouse, fabricated and assembled in yards near the drydock in which the ship's hull was laid down, has been placed on a rubber-tired trailer for haulage to the dock. The section is complete, even to the installation of piping and washbowls, glass in the portholes, doors on closets and passageways, all other piping and electric wiring, and even a section of the railing on the upper deck.

Pipes are made with sleeve ends to permit them to slide easily into corresponding pipes on other sections.

WPB halts production of metal plastering bases

Production of metal plastering bases and accessories, now on a quota basis, ceased Nov. 16 for any purpose except war procurement, when a "stop production" order, L-59-b, became effective.

The single exception contained in the order permits manufacturers to fabricate materials for the Army, Navy, Maritime Commission and War Shipping Administration, but only to the extent that metal plastering base and accessories are required by specifications directly applicable to purchase orders.

The products affected are chiefly expanded metal lath, metal stucco mesh, sheet metal lath, wire lath and any one or more of these in combination with a metal, paper, fabric or other backing. Metal guides, supports, fastenings and reinforcements of the types commonly used in the installation of metal lath and other metal bases are among the accessories which come within the scope of the order. Nails, clips and other devices for holding plaster made of nonmetallic materials will not be affected.

Saving of metal as a result of stopping production of metal lath is estimated at about 145,000 tons of steel and 5,000 tons of zinc annually, taking 1939 as a normal year for purposes of comparison.

Since February 1, 1942, the industry has operated on a quota basis, with tonnages and production schedules determined by restricting consumption of metal to a percentage of the amounts used in the base period, 1940–1941. Further limitations were imposed in July by reduction of the earlier quotas.

OPA revises ceiling on short-leaf southern pine

Because the urgent war needs for large timbers has made it necessary to range beyond the normal area of logging operations to find logs suitable for making such timber, the Office of Price Administration last week ordered a change of the entire table of maximum prices for large short-leaf southern pine timbers.

The action means that, instead of one length group of from 8 to 16 ft., and another from 18 to 20 ft., at two different prices on widths 9 in. and wider, there will be only one length group, of from 8 to 20 ft.—at one price.

This will result in an increase in the prices of the shorter lengths—those 8 to 16 ft. The prices on the longer lengths—18 to 20 ft.—will remain substantially the same. In a typical change, the price of timber 7x14 in. in any length 8 to 20 ft., becomes $54 per 1,000 bd.ft. Previously, the price was $50 in lengths of 8 to 16 ft., and $54 on lengths of 18 to 20 ft. Similarly, timber 6x10 in., in any length 8 to 20 ft., becomes $38 per 1,000, as compared to $36 previously for lengths 8 to 16 ft. and $40 on lengths 18 to 20 ft.

• • •

Urge establishment of national transport agency

Post-war establishment of a national transportation agency, to coordinate federal transportation activities and absorb existing development agencies is among major recommendations of a National Resources Planning Board report, transmitted to Congress recently.

Such an agency would "undertake leadership in programs for transport consolidation, terminal unification, and reconstruction; coordination of the various transport media, and encouragement of the development of new forms of transport within their respective economic spheres."

Among other recommendations included in the report are: extension of federal government credit to railway modernization and improvement programs; railroad consolidations, planning by highway transportation industry leaders and the federal and state governments for redesign of automotive equipment along functional lines and modern inter-regional highways and urban express roads.

• • •

Venezuela plans large public works program

Venezuela, biggest oil producer in the Western Hemisphere next to the United States, has announced plans for an extensive program of public works, to be financed with the aid of a $20,000,000 credit from the American Export-Import Bank.

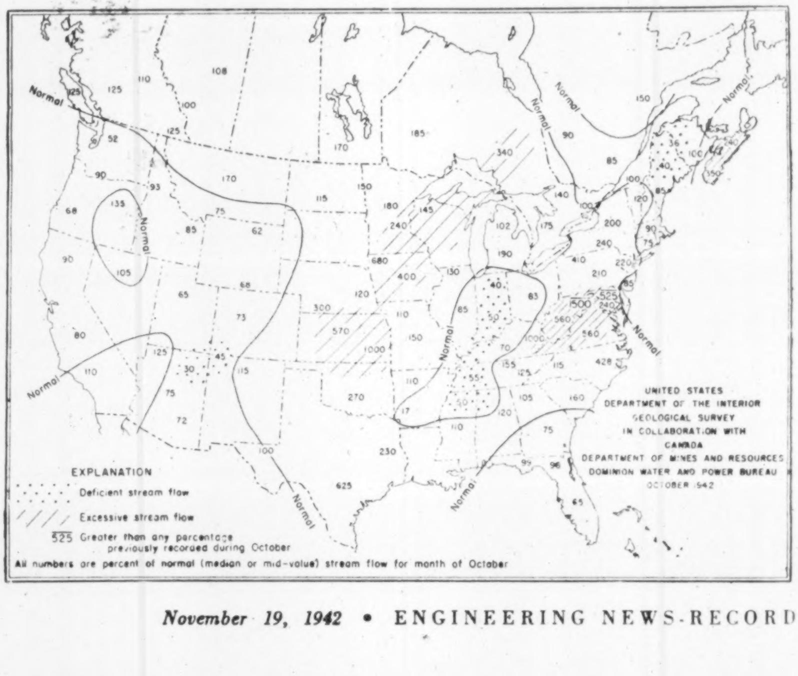
The program is expected to replace a loss in oil exports resulting from wartime tanker shortages.

Roads, hospitals, sewage systems, port facilities and similar items are among the improvements projected. Most of them will be aimed at assisting development of agricultural resources of the country, now largely confined to production of coffee and cocoa.

Monthly report lists Potomac flood; groundwater continues generally favorable

Extraordinary floods in the Potomac and Rappahannock River basins that approached and at some places exceeded all previous flood discharges of record are noted in the Water Resources Review for October. The flood was said to be especially severe on the Shenandoah River (*ENR*, Oct. 22, p. 534), which rose 6 to 8 ft. above the high level of the previous maximum.

Ground water conditions over the country continued generally favorable, except locally in areas of excessive pumping. Water levels in key observation wells at the end of the month were normal to high in states along the Eastern seaboard from Massachusetts to Florida, in the plains states and in Southern California. Comparatively low levels prevailed in central North Carolina, northern Alabama, southern Florida, northern Mississippi, Arizona and western Washington.


Normal
EXPLANATION
Deficient stream flow
Excessive stream flow
525 Greater than any percentage previously recorded during October
All numbers are percent of normal (median or mid-value) stream flow for month of October
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
IN COLLABORATION WITH
CANADA
DEPARTMENT OF MINES AND RESOURCES
DOMINION WATER AND POWER BUREAU
OCTOBER 1942

Internal reorganization of WPB places Searls in key construction policy post

Director of new Facilities Bureau will establish construction programs, take over much of work of former construction bureau

Last week's reorganization of the War Production Board's internal affairs is still largely on paper and many questions as to the exact assignment of duties are still open.

It is clear, however, that Fred Searls, director of the new Facilities Bureau, occupies the key post in determination of policy on construction matters. Searls is to work directly under Ferdinand Eberstadt, vice-chairman of WPB and head of the newly combined Office of Program Development and Office.

The Facilities Bureau will have charge of establishing the construction programs, passing on proposals submitted to it by other agencies. It will discover the facts as to material and labor requirements for proposed construction programs for submission with recommendations to the Requirements Committee, which makes all final allotments of material. It will set policy for the Facilities Review Committee and the Facility Clearance Board (*ENR*, Oct. 29, p. 597) headed by Col. Gordon E. Textor. It will take over most of the duties of the Bureau of Construction formerly headed by William V. Kahler, though it is not yet determined just where the detailed administration of order L-41, the "stop construction" order, will be placed.

Searls himself is a 54-year-old mining engineer, vice-president of the Newmont Mining Co. of New York City. In July, 1941 he became an industrial consultant to the British Purchasing Commission and six months later took a similar post with Army Ordnance.

Early this year Donald Nelson made him a member of the WPB Planning Committee.

• • •

Use 30,000 trailers as war housing stop-gap

The number of trailers to be used as stop-gap shelter in the nation's war housing program is being increased to about 30,000, Herbert Emmerich, commissioner of the Federal Public Housing Authority, said last week.

Mr. Emmerich announced that 2,500 trailers had been purchased in October and that applications had been filed with the War Production Board for 5,000 in November and 2,500 each in December and January. Prior to October, the government had ordered some 17,500 trailers and more than 10,000 now have been delivered and occupied.

Trailers are used in emergency situations where needs must be met before other housing can be constructed. With 30,000 such vehicles available, it is believed the majority of such emergencies can be met by moving the trailers from one location to another as the need arises.

• • •

Use of roads free to utility repair crews

The Alabama State Highway Department may not exact annual rental or revenue from a public utility for the use of roads and bridges by the utility in maintaining electric power transmission lines, according to a recent ruling by Attorney General William N. McQueen.

Highway Director W. G. Pruett had asked the attorney general for a ruling regarding rental charges of $350 per year assessed against the Alabama Power Co. for use of the Cochran bridge over Mobile River.

Ship production records topple in American yards

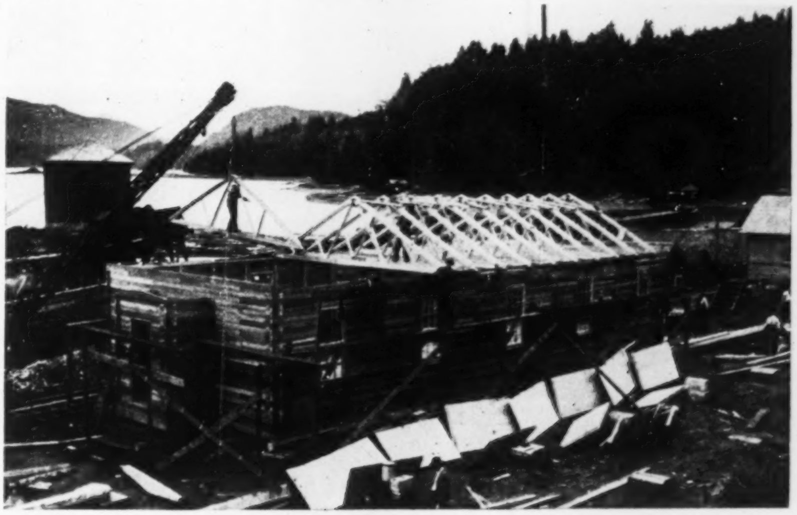
American shipyards engaged solely in the construction of Liberty Ships brought average time from keel-laying to delivery down to 66 days per ship during October, according to a Maritime Commission announcement last week.

Compared with the original contract requirements of 105 days for the completion of Liberty Ships, the October average is another indication that the original goal of 8,000,000 tons of new shipping by the end of this year will be met, the commission said.

The best previous average production time was 70.1 days per ship in September.

Oregon Shipbuilding Corporation again set the pace in October by delivering 12 ships in an average of 40.7 days. Bethlehem-Fairfield, on the East Coast, was second, delivering four ships into service in an average of 45.3 days, despite diversion of much of the yard's facilities to other types.

AFTER almost eighty years of complete dominance by males, Columbia University's School of Engineering has opened its courses to women.



Build log-camp structures in short order

When the cook-house and dining room at the main camp of the Allison Logging Co., at Cumshewa Inlet, Queen Charlotte Islands, B. C., were destroyed by fire recently, the company was able to replace the two buildings in 560 man-hours of work. The rebuilt cook-house is a 48x24 ft. structure, and the dining room is 120x24 ft.

Construction is of 2x6 tongued and grooved red cedar, corner staves being machined to give a factory-precision fit and slide easily into place. No nails are used. Floors are of five-ply panels covered with composition that makes the building warm and proof against drafts. Walls are lined with Douglas Fir plywood panels with narrow pilasters, giving an air space between outer and inner walls. Ceilings are treated in a similar manner.

Building materials were of the "Loxtave" type, manufactured by Prefabricated Buildings, Ltd., and shipped to the site in knocked-down condition.

Roof trusses are fabricated at the plant and hinged vertically for easier shipment. Plywood roof panels covered with composition roofing complete the job.

Biggest civilian force works on Alcan road

Mobile forces of more than 6,000 civilian workers were moved into Canada and Alaska by plane, truck, boat and railroad to join the Corps of Engineers in pushing the Alcan road through the wilderness, Commissioner Thomas H. MacDonald of the Public Roads Administration, said last week.

Returning from Alaska after a month of inspection for the PRA, Commissioner MacDonald reported that the civilian force was the largest ever put to work on a single highway job.

With this large construction force went the trail and highway building equipment of 52 Canadian and American contractors, supplemented by hundreds of tractors, power shovels, portable repair shops and electric plants assembled from Civilian Conservation Corps camps in many states.

In a report to Maj. Gen. Philip B. Fleming, Federal Works Administrator, Mr. MacDonald said that PRA began assembling the civilian force on March 6. For quick enlargement of the supervisory staff, contracts were negotiated with four engineering firms to act as project managers. These firms are C. F. Lytle Co. and Green Construction Co. (organized as a single firm) of Sioux City, Iowa; Dowell Construction Co. of Seattle, Wash.; R. Melville Smith Co., of Toronto, Canada, and Okes Construction Co. of St. Paul, Minn. These contractors immediately recruited the 52 construction contractors who began the movement of men and materials to the job. E. W. Elliott of Seattle, Wash., took a contract for movement of all equipment and the erection of shops, warehouses and other buildings.

A great deal of equipment was transferred from the now defunct Civilian Conservation Corps to supplement the equipment owned by contractors. Among the major items were 300 tractors equipped as scrapers, bulldozers or trailbuilders, 1,000 trucks, 125 air compressors with drilling accessories, 55 power shovels, 200 electric light plants, 65 portable repair shops. Mixers, rollers, pumps and trailers were also supplied.

For water transportation, the PRA has obtained the use of 5 steamships, 1 motor ship, 5 yachts, 14 barges and 10 tugs. Of the total force employed on the work, about 1,200 men were flown to the northern end of the project and the rest came by rail or boat.

American and Canadian contractors have already brought near completion the grading and surfacing of 102 miles of permanent road built to high modern standards, Commissioner MacDonald said. Seventy-seven miles of this work is on the south end of the project where it was unnecessary to build pioneer road.

ALCAN HIGHWAY DIARY

Harold W. Richardson of Engineering News-Record reports his progress in covering this strategic construction job.

(Second of a series)

WHITEHORSE, Y. T., THURSDAY, OCT. 15, 1942—Arrived here last night. Col. Paules, commander Northern Sector, sent a carryall truck to pick me up at Watson Lake, 324 miles from here. I've traveled 1,034 miles over the project—60 mi. in a command car, 650 miles in a jeep and 324 miles in a carryall truck. I'll never be the same again.

Watson Lake to Morley Bay on Teslin Lake pretty rough going. Not much improved since original work—but that was much better than most sections—would say it is about minimum standard for passage. From Morley Lake to here is in fine shape. PRA contractors have graveled most of it. Had to come around by Carcross on account of Lewis River bridge construction on the cut-off due east of here. Crossed 3 ferries yesterday—tied up 2 hr. at one and 3 hr. at another; first time because of traffic congestion and second because of high wind blowing the ferry barge and outboard motor power boat mile up the river.

Thirty-three families at Indian village of Teslin (entire population) down with measles. Canadian Mounties and padres are nursing and cooking. U. S. Engineers are cutting wood to keep 'em alive.

The south end of Northern Sector is served by the narrow-gage White Pass & Yukon R. R. from Skagway to here. Army has taken the railroad over to great extent, and lot of D. & R. G. W. narrow-gage equipment is coming in from Colorado to bolster up the supply line.

Col. Paules suggests going on west from here to the lead "Cat" camp—then hop over uncompleted gap by plane to Fairbanks and work back to where north and south crews next meet. Wants me there for the ceremony. I'll still be the first to cover the entire project on the ground. I understand there is tough going at upper end of stretch out of here—working on ledge ice. Temperature up there—4 deg. Want to spend a couple of days here before starting out.

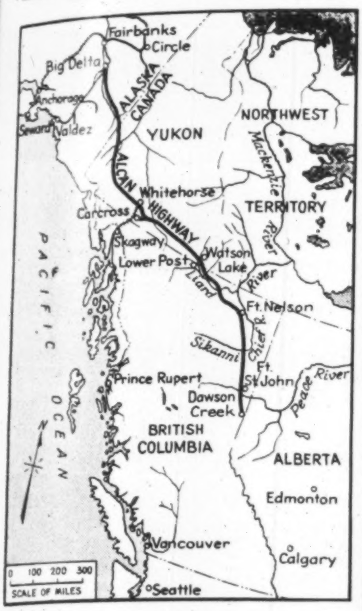
Am feeling fine—have had some uncomfortable moments, rather hours, but no worse than all the boys on the line put up with. Right now am staying in comfortable PRA barracks; even have a private room.

From the way they talk around here, I haven't seen anything yet in the way of rough going or rugged country.

Moose, bear and mountain sheep all through the country I have just

NORTHWEST SERVICE COMMAND

Consultation on the job. Left to right, Col. K. B. Bush, chief of staff Northwest Service Command; H. W. Richardson, and Col. John A. Wheeler, engineer officer in charge.



covered, but I have seen nothing bigger than a fox. Heard the wolves howl night before last at Morley Bay.

FRIDAY NIGHT, OCT. 16, 1942—Went out today to look at the 56-mile cutoff being built directly east of here to avoid Carcross. Miserable day—rain and snow, started out in a suburban truck, got stuck, pushed ½ mile by Cat D8—returned to suburban by boat on Marsh Lake—saw a couple of interesting bridges.

OCT. 21, 1942—Returned here last night after a trip to end of line 250 miles west. Flew up part of the way, then rode to last contractor's camp where we spent Sunday night. Temperature got down to zero, but the big freeze hasn't come yet. Walked up to the last Army outpost, 10 miles farther. Interesting construction over perpetually frozen ground. Permanent frost here is 12 in. below surface. Rather than try to disturb it, the procedure is to leave the moss and humus in place, fell the trees and brush across the line as further insulation, then fill for the road on top of the brush and trees. Difficult to find enough unfrozen material for fill, but they are getting most of it out of slide banks and side-hill cuts.

Outfit working south on Alaska road is closing in on outfit working west from here. May meet soon, but official tape-cutting is now set for Nov. 20. H.W.R.

P.S. Had moose steak for lunch.

Receive first pipe for Texas-East Coast oil line

The first shipment of seamless steel pipe for the eastward extension of the War Emergency Pipeline (*ENR*, Nov. 5, p. 617) is now en route from an Ohio mill to strategic points along the eastbound right-of-way, Petroleum Coordinator for War Harold L. Ickes announced last week.

Deliveries will be maintained at the same rate achieved throughout construction of the Texas-Illinois leg of the line to permit continuance of the present record construction pace. A contract covering the first 360 miles of pipe required for the completion of the line from Norris City, Ill., to the East coast was let by War Emergency Pipelines, Inc.—an organization made up of oil companies for the purpose of building this vital defense link—to the National Tube Co. on Oct. 30.

Meanwhile, Coordinator Ickes said that initial delivery of oil through the new pipeline may be moved ahead several precious days as a result of rapid construction.

The 530-mile first leg of the pipeline from east Texas to southern Illinois is expected to be in service in January, Ickes said. More than 345 miles of pipe has been entrenched.

Work was described as being two weeks ahead of schedule.

Deputy Coordinator Ralph K. Davies said that one-half of the pipeline's rated capacity of 300,000 barrels a day through Midwest terminals will be realized by January. Deliveries will step up to maximum as additional pumping stations are completed, he said.

• • •

Asphalt concern to become shipbuilder

Stockholders of the Barber Asphalt Corp., of Perth Amboy, N. J., at a recent meeting, voted to amend the certificate of incorporation so as to include shipbuilders among the specifically stated corporate objects if undertaken during a period of war or national emergency.

After reaching an agreement with the Navy Department for construction of ships, the company, last June, subscribed $1,000,000 for all the issued stock of the New Jersey Shipbuilding Corp., to provide adequate working capital, and agreed to furnish an additional million dollars if and when additional working capital may be required. At the same time, the company leased to the shipbuilding corporation a shipyard site and several buildings, including equipment, rental to be paid by the Navy as part of the cost of the ships.

Plan major railway line extension in Mexico

Described by the Mexican Ministry of Communications and Public Works as the most important railroad construction job of 1943, the Kansas City, Mexico & Orient Railway—now government owned—in Chihuahua state, will be connected with the Southern Pacific Railway of Mexico in Sonora.

Plans for the undertaking have been completed, and a tentative budget allowance of $11,850,000 has been set aside for this work in the coming year.

In announcing its plans, the ministry said that connection of the two railroads is of great military and civilian importance, since it will make possible greater service to the Mexican northwest—a region of mining, industrial and agricultural centers.

The work is scheduled to begin in early January.

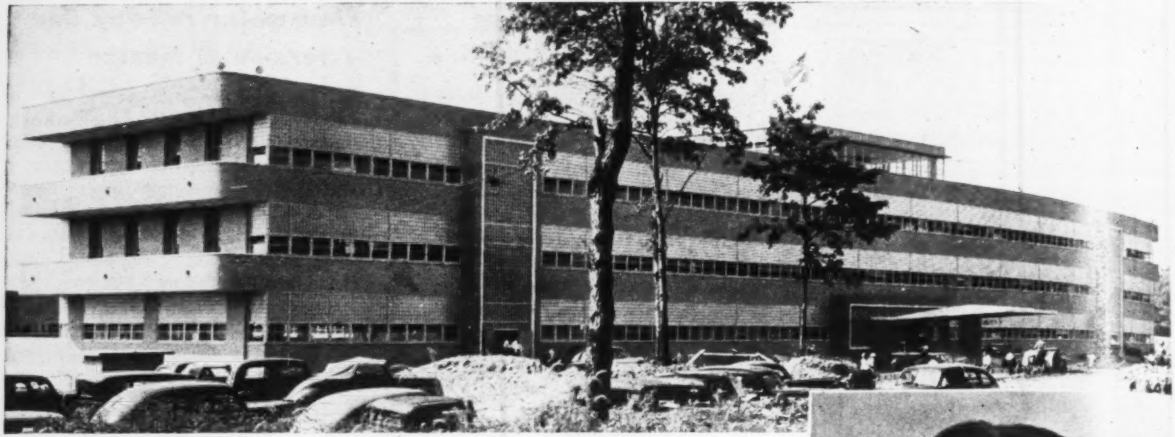
Another railroad extension project planned by the Mexican government is completion of a short line between Mexico City and Tampico.

This line was started some years ago by the National Railways, then a semi-official company, but suspended due to lack of funds. The government announced that work on the line will be resumed, to cut the running time between the Mexican capital and Tampico to 12 hours from the present 29 or more hours necessitated by switchings and roundabout routes.

Press Assn. Photo

Metal cornices for scrap

Another form of scrap metals, available in most cities here is being removed from the roof of the old Ansonia Hotel in New York City, to be thrown onto the war scrap pile. The heavy metal cornices—which once formed one of the chief architectural features of the building will be converted to munitions.



Spectacular new office building and its architect

Both in appearance and structural layout, this new office building, financed by Defense Plant Corporation for the Sperry Gyroscope Company is characterized by a spectacular quality seldom associated with projects of this type. Brick, movable clear glass sash and glass block in long horizontal bands comprise the walls, whose long sweep is broken only by entrances. Two entrances are marked by vertical glass block enclosed stairwells, the third is emphasized by a cantilevered concrete portico, supported by a single large column.

The building frame is of reinforced concrete, and from a structural standpoint is notable for its use of cantilever construction. Thus the 60-ft. width is divided into a 30-ft. center bay with two 15-ft. cantilevers on either side. This arrangement permits shallow floors and requires only two lines of columns. Cantilevers are also used at the ends of the buildings, where they serve as open balconies.

Principal credit for conception of the design and for its successful execution is given to N. N. Culin, the Sperry Company's architectural supervisor. Designer and builder was the Stone & Webster Engineering Corporation.

John E. Greiner dies, was honorary A.S.C.E. member

John Edwin Greiner, 83, nationally known as a bridge engineer, and a former director and honorary member of the American Society of Civil Engineers, died Nov. 15 at his home in Baltimore.

He had served both the state of Maryland and Baltimore City as consulting engineer, was chairman of the Port Development Commission from 1920 to 1927, and had been assistant engineer of the Baltimore & Ohio Railroad.

Honored many times by the Am. Soc. C. E., Mr. Greiner won a gold medal in 1896 for a paper on "The Life of Bridges" and in 1915 received the James Laurie prize for a discussion on "Coal Piers on the Atlantic Seaboard." He became an honorary member of the society in 1932. Heading his own company since 1908, Mr. Greiner was engaged in construction of many bridges and buildings throughout the East. In 1917 he was a member of the U.S. railroad commission sent to Russia by President Wilson, Mr. Greiner's duties being to pass on the load capacity of Russian bridges.

Probably his company's most ambitious work in relation to Maryland has been the preparation of plans for the entire bridge program of the Maryland Roads Commission.

Army engineers to set up new Pacific Division

A new Pacific Division, Corps of Engineers, that will include three present divisions, is to be set up soon with headquarters at Salt Lake City, Utah, according to information made available at Portland, Ore.

The new division will be commanded by Brig. Gen. Warren T. Hannum (*ENR*, June 18, p. 969) who is now head of the South Pacific Division.

The present North Pacific division, headed by Col. Richard Park, with headquarters in Portland, will be merged with the South Pacific and Mountain divisions. Colonel Park will have charge of the Seattle district of the new division.

The merger will mean a change of assignment for 90 officers and civilian employees of the corps in Portland. It is not expected that the 100 employees of the real estate division will be shifted, since that organization probably will remain in Portland as a sub-office.

NONE OF Oregon's famous scenic highways will be kept open for scenic purposes this year, R. H. Baldock, engineer for the state highway commission, has announced. Shortage of funds and heavy military demands for snow removal equipment necessitate the new policy.

Contracts awarded for Colombian chemical plant

The H. K. Ferguson Co., industrial engineers and builders of Cleveland, Ohio, and New York, N. Y., announced last week that it has been awarded contracts for an ammonia soda process plant at Bogota, Colombia, S. A.

The plant will be built for an agency of the Colombian government, and will cost several million dollars. Design work for the project is now under way in the company's Cleveland office, and purchasing of equipment is expected to start soon. Construction will not begin for several months. The new plant is planned to produce sufficient soda ash and bicarbonate of soda to supply the industries of the Colombian interior.

S. W. Cooley has been sent to Bogota to represent the company at the job site.

• • •

Construction employment seen declining

Employment on construction reached a peak of 2,131,000 men last August and is now declining, the Social Security Board estimates. Employment is expected to drop to 1,700,000 men by December, hold this level until about June, and then decline to something like 1,000,000 men by December, 1943.

OBITUARY

Daniel Webster McMorris, 77, former city engineer of Seattle, Wash., and one of the builders of the fortifications on Corregidor in Manila Bay, died Nov. 9 at Seattle. He was head of the Seattle city engineering department until his retirement in 1934.

Andrew Don Swan, 69, for more than two decades one of Canada's best known consulting engineers, died recently in Edinburgh, Scotland. Mr. Swan, who retired from practice in Montreal in 1932 and went to England to live, became active again as regional works adviser for Scotland for the British Ministry of Home Security, soon after the outbreak of the war.

M. E. Jones, 70, civil engineer of Granite Falls, N. C., died there Nov. 5. He was a former county engineer for Surry County, N. C., and for the Chesapeake & Ohio Railroad.

Thomas S. Saunders, 62, English consulting and mining engineer in Mexico, died Oct. 28 at Mexico City.

Lewis A. Quigley, city water superintendent in Fort Worth, Tex., since 1925, died there recently.

Gen. Enrique Estrada, 53, general manager of the National Railways of Mexico and a well known construction engineer, died Nov. 3 at Mexico City.

R. L. Moore, 50, resident engineer with the Iowa highway commission since 1926, died at Decorah, Iowa, recently.

Edward J. Dougherty, Baltimore civil engineer and president of the E. J. Dougherty Construction Co., died Nov. 11.

Merritt Drane, 77, former Jefferson County, Ky., engineer and surveyor, died at his home at Lyndon Nov. 11. He had engaged in private practice as an engineer and surveyor since leaving the county service in 1934.

Arthur G. Singer, 69, for 40 years a civil engineer for the Philadelphia department of public works, died there recently. Mr. Singer retired from the city service in 1933.

A. W. Parker, who at one time served as estimator and superintendent of construction for the English and Canadian governments in Egypt, died Nov. 10 in Oakland, Cal.

Carleton Greene, 75, retired civil engineer who was formerly senior partner in the firm of Greene and Greene, of New York City, died Nov. 14 at South Orange, New Jersey.

Henry E. Hood, 71, civil engineer of York, S. C., died there Nov. 10.

George Martin Trips, a retired construction engineer of Lometa, California, died Nov. 7 at San Francisco.

James A. Simmons, retired engineer of Florence, Ala., died Nov. 8. He had served eight years with the U. S. Engineers in the Panama Canal Zone before returning to Florence seven years ago.

Walter S. Wyman, 68, an outstanding engineer and executive in the field of hydroelectric development in northern New England, died at Augusta, Maine, Nov. 15.

James Shipp Caldwell, 61, founder of the Valley Paving & Construction Co., and a past president of the Northern California Chapter of the Associated General Contractors of California, died Nov. 9 in Fresno.

Fred Seymour, 67, Nashwaakssis, N. B., contractor, died at his home there Nov. 3.

Wlliam T. Fraser, of Westville, N. S., a contractor there, died recently.

C. Fred Watkins, 49, building contractor of Kent, Ohio, died there recently.

CONTRACTS AND CAPITAL

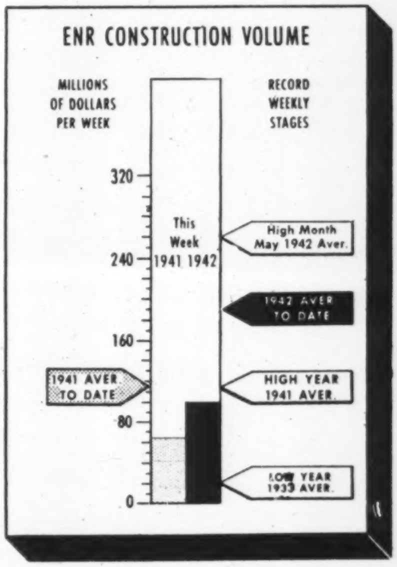
ENGINEERING CONSTRUCTION volume for the week totals $100.060.000, an increase of 56 percent over the corresponding week last year, but 67 percent below the near-record volume of last week. Public construction tops a year ago by 92 percent as a result of the 146 percent gain in federal work. Public is, however, 68 percent lower than a week ago, and federal volume is down 69 percent. Private construction is 60 and 21 percent lower, respectively, than a year ago and a week ago.

The current week's construction brings 1942 volume to $8,866,278,000, an increase of 62 percent over the corresponding 47-week period last year. Private work, $533,855,000, is 52 percent below the 1941 period, but public construction, $8,332,423,000, climbs 90 percent due to the 140 percent gain in federal work.

In the classified construction groups, gains over last week are in industrial buildings, and earthwork and drainage. Increases over the 1941 week are in waterworks, sewerage, public buildings, and unclassified construction.

New capital for construction purposes for the week, $613,890,000, compares with $12,686,000 for the week in 1941. The current week's new financing is made up of $500,000 in corporate security issues, $1,102,000 in state and municipal bond sales, and $612,288,000 in federal appropriations for construction.

New construction financing for the year to date, $10,201,425,000, is 63 percent above the $6,258,369,000 reported for the 47-week period in 1941.



CONTRACTS

(Thousands of dollars)

	Week Ending Nov. 20 1941	Nov. 12 1942	Nov. 19 1942
Federal	$ 36,875	$290,768	$ 90,897
State & Municipal	12,242	5,854	3,192
Total public	$ 49,117	$296,622	$ 94,089
Total private	14,983	7,599	5,971
TOTALS	$ 64,100	$304,221	$100,060
Cumulative			
1942 (47 weeks)			$8,866,278
1941 (47 weeks)			$5,488,679

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 47 weeks	1942 47 weeks
NON-FEDERAL	$1,307,251	$622,239
Corp. Securities	347,119	174,989
State & Mun	396,202	208,095
U.S.H.A. loans	30,399	....
R.E.A. loans	100,500	....
R.F.C. loans	270,031	156,455
Fed.-Aid—Highways	163,000	82,700
FEDERAL	$4,951,118	$9,579,186
TOTAL CAPITAL	$6,258,369	$10,201,425

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Nov. '42	283.64	136.35
Building Cost	Nov. '42	226.58	122.48
Volume	Oct. '42	421	185

FHA MORTGAGES

	Week Ending Nov. 15 1941	Nov. 7 1942	Nov. 14 1942
Selected for appraisal			
Title II	$16,607	$4,197	$4,140*
Title VI	$3,385	$11,031	$9,956*

*Subject to revision.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Emergency Concrete Design

Sir: The new WPB concrete specification certainly will have an excellent influence on the desired purpose to save reinforcing steel in concrete structures. The increase of the permitted steel stresses to 20,000 and 24,000 respectively is absolutely justified, but only on one very important condition, i.e. that a correspondingly good concrete be used. The minimum should be 3,000 lb. If this condition is not fulfilled, bigger cracks and possibly other destructions will occur, and reinforced concrete will be discredited. Fortunately, to produce good concrete is normally only a question of care, and does not need any priority material.

But in this respect the new emergency specification is not clear enough. It might even be feared that the provided reduction of the permitted concrete stresses from 0.45 f_c' to 0.35 f_c' is rather misleading. Such a regulation is not necessary to throw more of the load onto the concrete. It is well known that generally the most preferable depth of a beam, especially a T beam, will be attained with concrete stresses about 70 percent of the permitted stresses. These tally with the figures mentioned above, but such economical considerations should not be expressed by a reduction of the allowable concrete stresses. This result could be better attained by a limitation of the reinforcement's percentage. It is important that a minimum of 0.25 percent be provided.

In any case this paragraph increases the difficulties to obey the excellent prescription to avoid compressive reinforcement, wherever possible. In this regard the former version of the regulation must be preferred providing a 10 percent increase of concrete stresses adjacent to supports of continuous beams or rigid frames. This conforms with the regulations all over the world and it may serve as a good illustration that no case is known in the history of concrete where the structure failed for this reason. The lately coined words "Let the concrete do the job" hits the nail on the head.

Another point which should be emphasized is that the increased steel stresses require a basically sound calculation. In this case a general stress increase of 10 percent would be justified.

OSCAR SCHRIER
Civil Engineer
New York, N. Y.

Conservation Through Design

Sir: Reference is made to the letter of Stanley U. Benscoter (*ENR*, June 18, 1942) and that of John B. Hollyfield (*ENR*, Aug. 13, 1942) concerning conservation of steel.

The writer would like to disagree with Mr. Benscoter's statement "The civil engineer does not use advanced stress analysis in the design of his structures". The writer does and so do other engineers of his acquaintance, when the conditions warrant it.

There is no doubt that advanced stress analysis does effect savings in materials in many cases, but there is another reason for its use which is quite as important; namely, to discover deficiencies that the ordinary design methods do not disclose.

Doubtless it is true that young engineers fresh out of college can apply advanced analysis to given structures, but that is only part of the problem of conservation. The larger problem and the one which requires a background of wide experience in design and construction and cost analysis is the selection of the most economical type of construction to fit a given set of conditions, and the proper disposition of the structural members to achieve the greatest conservation of materials and money.

An engineer who has the combination of wide experience, native ingenuity and a sufficient knowledge of advanced stress analysis can quickly eliminate from consideration those types of design he knows will not meet the conditions, and confine his study to those he knows are likely to meet the requirements. Engineers with these qualifications are not numerous but full use has not been made of those that are available.

The government and other owners have not offered the proper inducements to contractors or to architects to cause them to spend the extra money for that kind of service. Government bureaus have not availed themselves of the services of outside experts to anywhere near the extent possible.

WALTER H. WHEELER
Designing & Consulting Engineer,
Minneapolis, Minn.

Emergency Concrete Specifications

Sir: The requirement in the new WPB concrete building specifications (*ENR*, Oct. 8, 1942, p. 463) that concrete stress in bending be reduced from 0.45 to 0.35 of the ultimate strength in order to increase the depth of beams, and thus reduce the amount of reinforcing steel, fails to take into consideration a number of important related items in ordinary building construction.

Designers are seldom free to make concrete sections as deep as economy of steel in beams and slabs alone would call for, being limited by the available clearances for head room and equipment. To reduce the allowable bending stresses in the concrete causes either an increase in the width of the beam stems, thus increasing the dead load, or the use of compressive steel or both. To increase the story heights to accommodate the deeper floor construction, would require longer stair runs with heavier slabs, an increase in the floor area of the building, a substantial increase in the dead weight of exterior walls, and longer and heavier column steel. Indirectly, the lengths of vertical plumbing, heating and equipment piping and conduits would be increased, which in industrial buildings is a substantial item.

The writer recently completed the structural design for a manufacturing building, now in course of construction, 100 ft. high by 46 ft. wide, crammed with piping and where every inch of vertical clearance had to be fought for. To have increased the depth of the floor beams 20 percent would have added more than 4 ft. to the height of the building and increased the already almost unmanageable wind stresses, in addition to the complications mentioned above.

It is the writer's conviction that this provision of the specification will result in waste of steel, piping, conduits, wiring, cement, aggregates, time, forms and labor, the supply of the last three being as severely limited as that of steel.

A designer, in certifying that he has complied with the new specifications, will be faced with the dilemma of complying with the intent, or with the letter of the provision.

G. M. STONE,
Structural Engineer,
Kingsport, Tenn.

High-Intensity Rainfall

Sir: The article "High-Intensity Rainfall at Larchmont" (*ENR*, Sept. 17, 1942, p. 439) by Arthur Richards, would give the impression that the storm therein reported is the heaviest for a one-hour period of any reported in the United States.

Reference to "Rainfall Intensity-Frequency Data", by D. L. Yarnell, U. S. Department of Agriculture Miscellaneous Publication No. 204, issued in August, 1935, will show a number of rains exceeding this in intensity, and at least two stations show storms of greater intensity continuing for two hours, and a few storms in which the rainfall for 45 min. exceeded the one-hour record at Larchmont. This publication covers the record of all Weather Bureau stations having recording gages, through the year 1933. With the large increase in the number of recording gages in the last five or six years, it may well be that even higher records have been established.

The data used by Mr. Richards must have been rather old, as the same figures (with several others exceeding two inches per hour) are given in the 5th edition of the "American Civil Engineers' Pocketbook," published in 1930.

G. G. COMMONS,
Office Engr., Board of Water Engineers,
Austin, Texas

Sir: The information given in "High-Intensity Rainfall at Larchmont" is apparently of almost ancient origin. In the U. S. Department of Agriculture, Miscellaneous Publication #204, issued August 1935 and entitled "Rainfall Frequency Data" by David L. Yarnell, there is recorded the following information on rates of precipitation:

Precipitation in Inches

	(5 min.)	(10 min.)	(60 min.)
Bismarck, N. D.	0.68	1.10	3.00
New York City	0.68	1.20	80 min. (2.75)
Galveston, Tex.	0.74	1.45	5.31
Taylor, Tex.	1.90	....	4.22
Brownsville, Tex.	0.64	1.28	4.75
Del Rio, Tex.	0.62	1.08	4.67
Hatteras, N. C.	0.61	1.21	5.26
Kansas City, Mo.	0.80	1.12	4.74
Key West, Fla.	0.65	0.99	4.30
Pensacola, Fla.	0.80	1.53	4.27
Richmond, Va.	0.70	1.28	4.02

From this table the following intensities of rainfall in inches per hour have been computed for the five, ten and sixty minute intervals.

Precipitation in Inches per Hour

	(5 min.)	(10 min.)	(60 min.)
Bismarck, N. D.	8.16	6.60	3.00
New York City	8.16	7.20	2.06
Galveston, Tex.	8.88	8.70	5.31
Taylor, Tex.	22.80	....	4.22
Brownsville, Tex.	7.68	7.68	4.75
Del Rio, Tex.	7.44	6.48	4.67
Hatteras, N. C.	7.32	7.26	5.26
Kansas City, Mo.	9.60	6.72	4.74
Key West, Fla.	7.80	5.94	4.30
Pensacola, Fla.	9.60	9.18	4.27
Richmond, Va.	8.40	7.68	4.02

It may be noted that the rates for the 60-minute period are all greater than four inches per hour except for New York City and Bismarck, N. D. This information contains data only through the year 1933.

In U. S. Water Supply Paper #796G there is recorded a rainfall of 22-24 inches in 3½ hours in the Woodward Ranch which is located west of San Antonio, Texas.

QUINTIN B. GRAVES
Asst. Prof. of Civil Engineering,
University of Texas, Austin, Tex.

Sir: Thanks are extended for the article "High-Intensity Rainfall at Larchmont" contributed by Arthur Richards, (*ENR*, Sept. 24, 1942, p. 439).

Additional data are available which bear on the relative degree to which the intensities of rainfall experienced at Larchmont on July 27, 1942 may be comparable to those of record at Bismarck, N. D., New York City and Galveston, Texas. Tabulation follows:

Rate of Maximum Rainfall Intensity in Inches per Hour

	5 minutes	10 minutes	60 minutes
Larchmont, N. Y.	6.00	5.28	3.59
Bismarck, N. D.	9.00	6.60 (6.00)	3.00 (2.00)
New York City	9.00 (7.20)	7.56 (4.92)	2.48 (1.60)
Galveston, Texas	8.88 (6.48)	8.70 (5.58)	5.31 (2.55)

Additional published records for New York State with less proximity to sources of moisture follow:

Albany		7.32	
Catskill			10.00
South Canisteo		7.32	
Oswego	8.88		

Values in parenthesis are those published in *ENR*, Sept. 24, page 439. The data for Bismarck are taken from U. S. Dept. of Agriculture Misc. Pub. No. 204. The New York City data are from the Annual Meteorological Summary, 1941, Weather Bureau.

The added records are from much less reliable sources as follows: Albany, "Heavy Rainfall Records," John R. Theaman, Book No. 2, May 1931, private publ., Indianapolis, Ind., page 7: Catskill, *ENR*, June 29, 1922, page 1,072; South Canisteo, Theaman above, same page; Oswego, Theaman as above page 4.

In *ENR*, June 29, 1922, p. 1,072, Ivan E. Houk lists other data for different periods, as at Catskill, July 26, 1819, 13.00 in. in 3 hr., or 4.33 in. per hour; 18.00 in. in 7 hr. 30 min., or 2.40 in. per hour; Flatbush, 9.00 in. in 8 hr., Aug. 22, 1843; Taborton, 8.95 in. in about 2 hr., or 4.47 in. per hour, and 11.62 in. in 24 hr.; and White Plains, 9.70 in. in 10 hr. 30 min., or 0.92 in. per hour. Oct. 9, 1877.

R. S. GOODRIDGE
Chevy Chase, Md.

Training Plan Questioned

Sir: Dean Saville's proposed government-sponsored engineering program (ENR Oct. 1, p 451) is unsound and unnecessary.

In the first place, where is this shortage of engineers? The Oct. 1 issue of ENR has about 4 in. of space for "Positions Vacant" and about 16 in. of space for "Positions Wanted." This condition has been true through 1942 more or less.

What does the dean propose doing with these youngsters after the war, when they will have to compete in a normal market? It is doubtful if war construction will continue to increase after May 1943 and by then, most of this year's high-school boys will be in the armed forces.

What appears to be a shortage of engineers is unsound use of local firms. Work in Florida is done by engineers from New York, New York work by engineers from Massachusetts, Connecticut work by engineers from New York, etc. Instead of first exhausting the local markets, government agencies, including the Army and Navy, arbitarily select engineer firms without due regard for the area normally served, and as a consequence, engineers are working everywhere but at home.

A. B. SLEATH,
Niantic, Conn.

EDITORIALS

VOLUME 129 NUMBER 21

November 19, 1942

BUILDING TO WIN

WITH THE AMERICAN OFFENSIVE launched in Northwest Africa, not only the United States' war effort but the construction industry's part in it enters a new phase. The first phase—building for defense—began in the middle of 1940 when France fell and Britain was threatened. It continued until that fateful morning of Dec. 7, 1941, when the sun rose above the promontory known as Diamond Head to reveal the devastation of Pearl Harbor and our own sluggishness in accepting our destined role as an active participant in the war. Then followed the phase of "building for war", a phase whose end is now marked by another and happier sunrise, that of Nov. 8, 1942, when the landing of American troops was silhouetted against the coastline of Africa from Casablanca clear around to Tunisia, site of the ancient city of Carthage.

Building for war is now at an end, defined by Mr. Churchill's accurate phrasing as "the end of the beginning". The obvious implication is that now we are ready to push the offensive home—to win the war. The new phase of the construction industry's participation in this offensive is, of course, that of building to win.

For civil engineers and construction men these phases are not just arbitrary periods marked off by emotional signposts. Each was characterized by definite jobs to do, and by new problems involving manpower, machines and materials. That these problems were successfully met is attested by the training camps, the war factories, the bases at home and abroad, the supply depots, the embarkation ports, the shipyards and even the ships that were ready on time. The construction industry comes to "the end of the beginning" with a justifiable feeling of satisfaction over a job well done.

But in building to win, the abilities of civil engineers and construction men are up for further test. Manpower will be scarcer, machines will be harder to get, familiar materials will often not be available at all. Although there may be less to build, it will bulk large because of these limitations. But the flexibility of mind, the ingenuity, hard work and courage that crowned the "building for war" period with success are still available in large quantity. And they will be needed, for "building to win" promises to be the toughest phase of the construction industry's war effort.

Air-Raid Protection Code

RECENTLY OUTLINED in these pages (Sept. 17, p. 391) was a code prepared by the Federal Works Agency to govern air-raid protection for buildings housing war activities. Three stages of protection are recommended, depending upon the location and nature of the structure, and the code goes so far as to recommend (for some locations) construction of shelters, addition of emergency sanitation in the shelter areas, subdivision of large workrooms by blast-proof walls and preparation for long and continued blackouts. A code explaining what and how protection can be provided is well and good, but to initiate at this time extensive construction for that purpose would seem to be a questionable procedure. Not only are large-scale air raids on American cities presently unlikely, but more important, the critical materials that would be required—and the demands would be large with the most economical designs—can best be used for more urgent war construction. There are also the problems of diverting construction equipment and manpower to air raid protection work and the cost of the work itself. As a final consideration, most of the air raid protection facilities that will be required can be built quickly once we know that extensive raids are imminent. The FWA's code is an excellent one, but it would be a mistake to translate its recommendations into construction now.

What's Construction Doing?

TWO ITEMS GLEANED from the day's mail are significant in these times. A contractor writes: "We have just finished the —— (war project) under the A.E.M. form of contract. Beginning without even a contour map, we had a ten-million-dollar project ready for operation within 90 calendar days, and gave them back $3\frac{1}{2}$ million of their estimated cost." Again, we note the following telegram from President Harry Morrison of Morrison-Knudsen Co. to employees on one of his projects: "Have just been advised 100 percent of all employees on naval ordnance plant project have subscribed for purchases of war bonds through payroll deduction plan and that such purchases will exceed 10 percent of payroll each month. Please accept my hearty congratulations." These are but two examples of the many ways in which construction is aiding the war effort.

A Step in the Right Direction

ALTHOUGH LATE in being announced, WPB's Limitation Order L-192, reported in these pages last week, puts the allocation of new and used construction equipment on a much-needed official basis. It is a step in the right direction. What is now required to complete the equipment picture is a better arrangement for the manufacture and distribution of supplies and repair parts. State highway departments and other essential but non-war organizations, for example, are finding it increasingly difficult to obtain necessary parts and supplies, and while they can perhaps worry through their present assignments, their complaints serve as a warning that the allocation of repair parts should receive more attention than it has to date. In England "essential" supplies and repair parts to keep the civilian economy functioning have priority over Army and Navy demands. This is possible, of course, because the minimum civilian requirements have been carefully determined and fixed, a task that we have so far tended to avoid. Now that controls over construction equipment manufacture and sale have been established, and largely in the direction of making it unavailable to non-war agencies, the problem of repair parts and supplies for essential civilian work must be faced. Home front activities may be secondary, but they are by no means non-essential. If highways are let fall into disrepair due to lack of serviceable equipment, delivery of supplies to men at the battle front may be seriously delayed.

Curved Box Girders

WORKING out satisfactory designs for grade separation structures has always called for ingenuity. It is no simple task to provide for easy, smooth flow of traffic, to get necessary overhead clearances within grade and curvature limitations and at the same time give the structure the necessary strength as well as a pleasing appearance. All these requirements have been met, however, in an overpass recently built in California whose deck is composed of curved box girders. Curved girders are not new, but in this case the structure is unusual in having curves of three kinds; namely, in grade, alignment and superelevation. Such a design could not have been handled in a simple and effective manner unless the designer had been familiar with box girder structures. Enough box girders have been built on the West Coast to justify the belief that this type of construction has arrived at an advanced stage of usefulness. There is satisfaction in finding that it permits simple architectural treatment devoid of meaningless decoration and paneling. In this particular case, the fine proportions of deck and column stand out in their rugged simplicity, and the clean unbroken soffit contributes much to a decidedly attractive appearance, despite the compound curvatures.

More Power for the Navy

AUTHORIZATION of an increase in the strength of the Navy's Construction Battalions, the Seabees, to 210,000 men is an event full of significance both for the Navy and the construction industry. Nor should the spectacular quality of the increase be overlooked; a year ago the Seabees did not exist, today they number approximately 100,000 men, which is about the size of the whole pre-war Navy, while at the now authorized strength they promise to approach the number of men in the Army's Corps of Engineers in the last war.

Thus does the Navy Department answer with characteristic boldness the challenge to build and maintain naval and air bases in all of the Seven Seas. Moreover, by placing the command of the Seabees in the hands of Civil Engineer Corps officers, the Navy has demonstrated its capacity to break with tradition, whenever such a course is required to wage modern war successfully. And it was obviously required in the case of the Seabees, for not only will specialist construction officers get the most in loyalty and work out of specialist construction men but, because of their technical background and training and their experience in handling large groups of men on construction projects, they are particularly apt in absorbing military and command instruction.

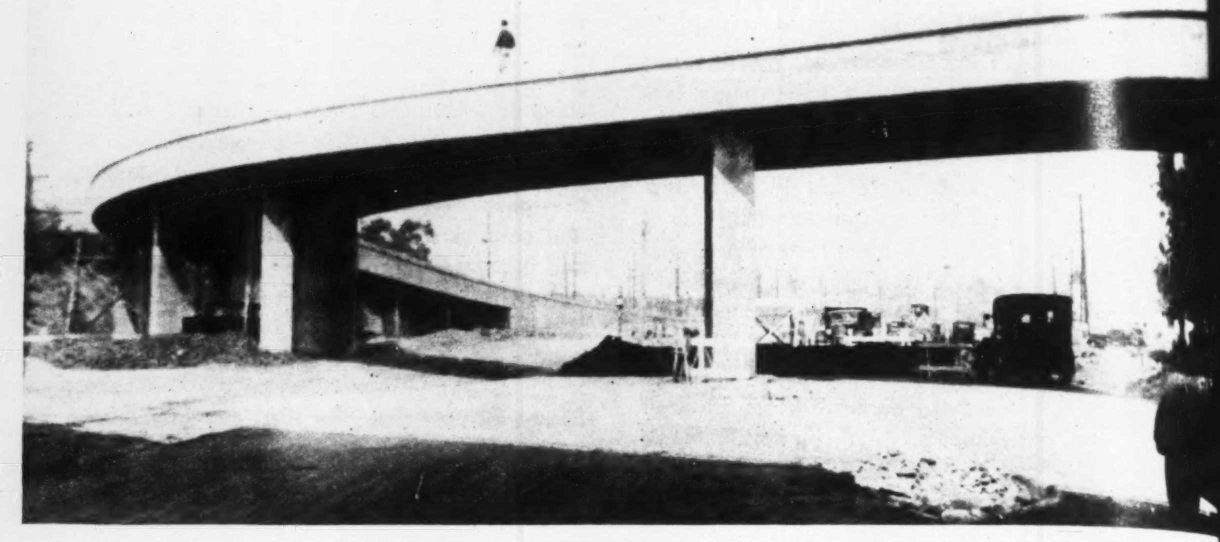
Seabee units already in the field have proved that the Navy's confidence in them was not misplaced. They have set a pattern for the engineers and construction men now in civilian life who are needed to swell the Seabees to their newly authorized strength. And these engineers and construction men, cognizant of the Navy's belief in them, will take up their jobs with confidence and enthusiasm. It all adds up to more power for the Navy.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor*

Copyright 1942, by McGraw-Hill Publishing Company, Inc.

EDWARD J. CLEARY, *Managing Editor. New York:* V. T. BOUGHTON, A. N. CARTER, H. W. HUNT, E. R. DENMARK, E. E. HALMOS, Jr. *Chicago:* H. W. RICHARDSON. *Washington:* PAUL WOOTON, R. B. COLBORN. *San Francisco:* N. A. BOWERS. *Consulting Editors:* F. E. SCHMITT, W. W. DeBERARD

EDITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.



General view of the overpass nearing completion. The maximum span, on a curve, is about 70 ft.

Curved Box Girders for Highway Overpass

Contents in Brief—*In constructing reinforced-concrete overpasses at Los Angeles, box girders were built on curves in preference to a straight-line design because the curved construction cost less and fitted requirements more precisely. Each of two bridges has four lines of girders curved on radii ranging down to 200 ft.; spans, measured on curve, range up to 70 ft.*

REINFORCED-CONCRETE box girders built with sharp horizontal curvature were found to be the best means of meeting structural and esthetic demands in the over-pass bridges that carry Pomeroy and Soto Streets over Ramona Blvd. in Los Angeles. The two bridges, each about 400 ft. long, provide 24-ft. roadways for one-way traffic. In addition to curvature in alignment there is vertical curvature ranging up to 7 percent and superelevation. Thus the structures resemble elevated box culverts that (1) curve horizontally to conform to the roadway alignment, (2) follow vertical curves conforming to the highway grade, and (3) tilt sideways to provide varying superelevation.

The deck structure in each bridge consists of four lines of girders spaced 10 ft. apart, which, with top and bottom slabs, form three box girders. Despite span lengths varying from 40 to 70 ft., a constant girder depth of 4 ft. is maintained throughout. One structure has girders built on reverse curves whose radii range from 615 ft. down to 200 ft. (29 deg.). The other has girders built on compound curves of radii varying from 1,360 down to 200 ft.

Foundation conditions were such that footing pressure was held down to two tons per square foot. Because open column bents appeared to be rather flexible, there was at first some concern as to the possible effect of the combination of temperature, shrinkage, and torsional moments on a continuous curved girder design. Therefore, during the preliminary design stage, consideration was given to simple span, straight girder construction for that portion of the bridge that has a 70-ft. span on a 29-deg. curve.

The conclusions reached by the designers after a comparison of the two types were as follows:

REINFORCED CONCRETE GIRDERS BUILT ON A CURVE ON THE CALIFORNIA HIGHWAY SYSTEM

Date	Name	Radius of Curvature, ft.	Maximum Span Length, ft.
1938	S. F. Pacheco Cr..	2,000	44
1938	Pacheco Cr.	2,000	67
1939	Funston Ave......	299	78
1940	San Rafael Viaduct	1,050	40
1940	Schooner Gulch...	800	120

1. The simple-span, straight-girder type was found to cost considerably more.

2. For the straight-girder layout the development of the members for the sharp curves, with abrupt changes in grade and superelevation, would have been difficult and awkward, would have required more head room, and would have been less resistant to external side loads.

3. While the construction of box girders curved in a horizontal plane was somewhat unusual, there appeared to be no forces, moments, or torsions that could not be adequately provided for by reinforcement and proper construction details.

4. It was further concluded that the difficulty of forming the girders to a horizontal curve would be more than compensated for by the simplification of other details, such as constant distance between girders, constant depth of girders, and constant overhang outside of girders.

5. The straight girders, in contrast with the sharp curvature, would result in an unsatisfactory appearance with varying dimensions and akwward, cut-up details. The curved girders on the other hand present a structure with pleasingly continuous lines and surfaces.

Underside of the curved box-girder overpass. Caps connecting columns are enclosed within the deck structure.

Design analysis indicated that although the middle ordinates of the 70-ft. curved beams were approximately 3 ft., the torsional moments could easily be counterbalanced by: (1) special reinforcement of girder webs, (2) use of diaphragms at about 15-ft. centers rigidly tying together the four lines of girders, and (3) the great stiffening effect of the top and bottom slabs of the box girder construction.

The torsional reinforcement is composed of two groups of diagonal stirrups enclosing the four surfaces of each beam. The bars in the vertical surfaces are tipped at an angle of 45 deg., pointing upward toward the center of the beam on the concave side, and downward toward the center on the convex side. At the ends of the girders the torsional moments are received by heavy bent-caps that transfer the torque to the columns and eventually to the footings. Torsional reinforcement added but a fraction of one percent to the cost of the structure.

Thickness of the bottom slab varies from 3 in. at the center of the span (where the principal function of the concrete is to encase the reinforcing steel carrying tension) to 6 in. near the support where the bottom of the beam is in compression. The structure is designed to resist a horizontal seismic force of 0.06 g. During construction the alignment of the girders was accomplished by lowering plumb bobs through small holes bored in the bottom slab forms to an exact layout of the girders previously made on the ground.

To give the outside girders a smooth surface, $\frac{5}{8}$-in. plywood extending the full depth of girders was used in forming. Bolts on 16-in. centers drew the forms into place and held them firmly in line. Forms for the inside girders and fillets that are hidden from view were built on short chords.

Since no wearing surface was placed on the concrete deck, considerable care was used in finishing the roadway surface to a smooth grade. Longitudinal 2x4-in. screeds located at each gutter line with laps spliced for continuity were supported by adjustable bolts at 6-ft. intervals. The bottom edge of the screed was thus constantly maintained at the elevation prescribed for the finished concrete deck. Screeds were set to give a $\frac{1}{2}$-in. camber in the 40-ft. spans and $\frac{3}{4}$ in. in the 70-ft. spans.

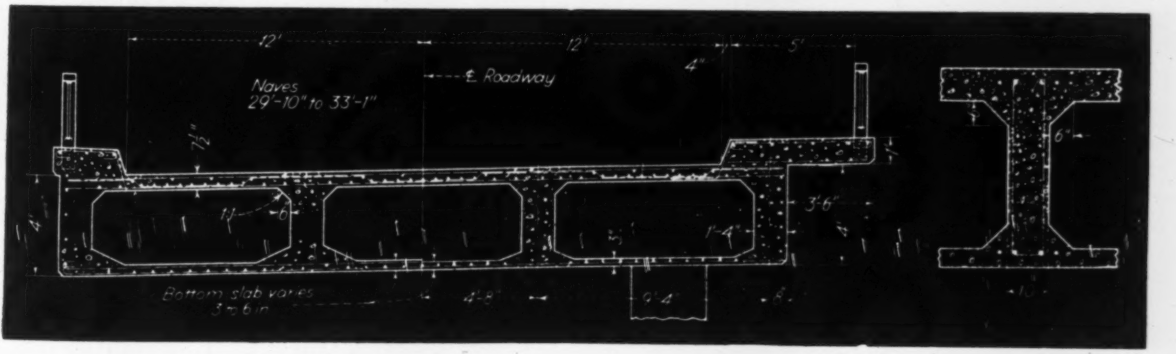
California has constructed other reinforced concrete girders on horizontal curves as listed in the accompanying table. Latest inspection of these structures has revealed no cracks of any kind that could be attributed to the torsional effect of the curvature.

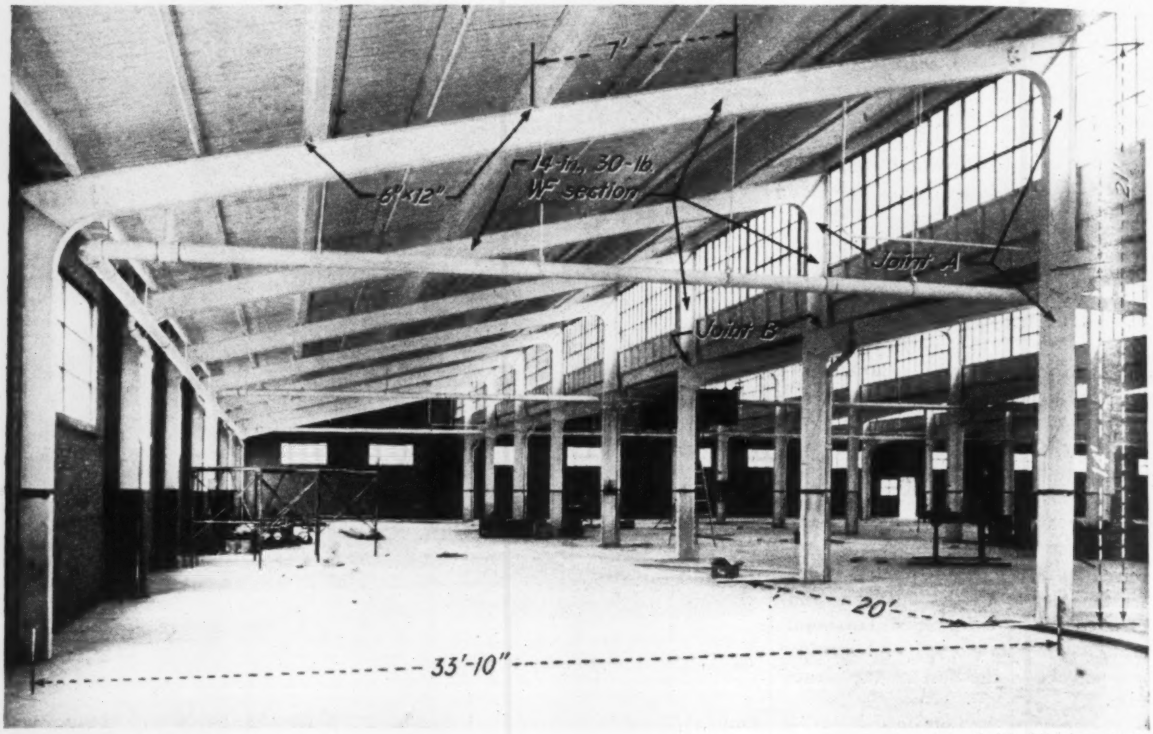
From experience with these former applications of the curved girder design and the two described herein, the following general conclusions have been suggested:

1. The use of curved girders has a place among today's highway structures, to make them more easily conform to modern alignment and to improve their appearance.
2. The torsional moments can be easily provided for in the design.
3. Modern construction methods make it possible to construct girders to curves with comparative ease.

The structures described were designed and built by the California Division of Highways under direction of F. W. Panhorst, bridge engineer. Leonard Hollister, chief designing engineer, supplied the data presented in this article.

Typical transverse section of the box girders is shown at the left and a typical diaphragm at the right.





C. W. Ackerman photos

Fig. 1. Steel requirements for this building were kept to a minimum by the use of all-welded rigid frames and timber purlins.

Welded Frames Cut Cost and Save Steel

F. W. Mettler

Consulting Structural Engineer, Cleveland, Ohio

Contents in Brief—*A typical one-story industrial plant of welded, rigid-frame construction, with wood purlins, is here used as an example to compare the cost and steel saving advantages of this type of design over that of conventional truss construction for a similar building with the same floor area.*

WHERE ONE-STORY FACTORIES and plant additions must be built with steel frames, a large tonnage of structural steel can be saved if welded, rigid-frame construction is used and if wood purlins are substituted for the usual steel purlins. Some idea of this possible saving can be gained by comparison of the steel demands for truss and rigid-frame designs for buildings of the type shown in the accompanying illustrations.

Conventional one-story truss structures with steel purlins require approximately 8.4 lb. of steel per sq.ft. of the building area, but by changing to wood purlins about 2 lb. of steel per sq.ft. can be eliminated, thus reducing the steel requirements to about 6.4 lb. per sq.ft. of floor space. A further steel saving of 20 percent is possible by changing to a welded, rigid-frame design, since the framework for this type of building can be constructed with about 5 lb. of steel per sq.ft. of building area. In addition to the important economies in steel, which is daily becoming more difficult to obtain, other economies accrue because the shop fabrication and field costs on this type of building are much lower than on the conventional truss design.

The building illustrated provides new storage and shipping facilities for the Commercial Bookbinding Co. at Cleveland, Ohio. The one-story structure measures 200 ft. by 244 ft. 9 in. and provides a floor area of 48,950 sq. ft. The arc-welded rigid frames are on 20-ft. centers and each frame is composed of six spans of 33 ft. 10 in. and one span of 39 ft. 2 in., center to center of columns. In the smaller spans 14-in., 30-lb., wide-flange sections are used for both the beams and columns and in the longer span 16-in., 36-lb. wide-flange members are employed. The rafter knees are welded plates of the same thickness as the webs and flanges of the beams.

A foundation soil of hard clay and shale was encountered and spread footings designed for a soil load of 4,000 lb. per sq.ft. were constructed. The column bases were embedded in the 5-in. thick, reinforced-concrete floor slab, thus assuring fixed-end conditions for the framework. The outside walls are 13-in. brickwork, and the roof construction is 6x12-in. wood purlins on 7-ft. centers covered by a 2-in. planking and a 4-ply asphalt covering.

Structural steel for the building totaled 110 tons or 4.5 lb. per sq. ft. Preparation of the engineering design for this plant required but six hours time and the shop fabrication drawings 32 hours of drafting. The latter work at $1.25 per hour would total $40, which is 36.3c. per ton of steel. This cost is very low for, in general, shop drawings for the conventional type of buildings will cost 85c. per ton for beam work to $2 per ton and higher for truss work, as with wages of July 1, 1942.

The contract for the building was awarded in December 1940 and the total cost was $2.21 per sq.ft., which included all mechanical trades as well as the sprinkler system that was extended from a neighboring building. Shop fabrication and field erection costs were much lower on this building than for conventional types of steel design. In the fabricator's shop a 300-amp. welding machine was used and shop fabrication was on the column sections only. This work included welding the base plates, the rafter joints and upper column sections. Each column was completely fabricated in seven hours; wages were 70c. per hour and the fabricating cost on the columns was $10.77 per ton.

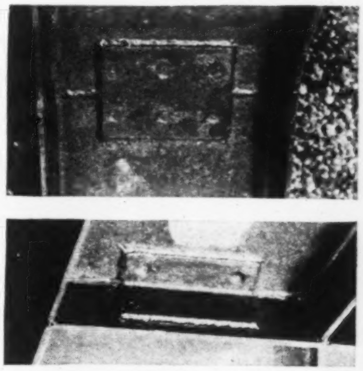


Fig. 2. Photograph at top shows detail of the splice designated as Joint A in Fig. 1. For this joint, which was made in the fabricating shop, a 6x6x¼-in. tie plate was used either side of the web; fitting up bolts held the plates in place until a fillet weld along all edges of the plates could be added, then the bolts were removed, the holes filled, and the remainder of the flange and the webs joined. At the bottom is illustrated detail of Joint B, which was used in assembling the upper column sections. A clip angle of the type shown is used either side of the web.

The rafters were plain punched beams with a shop cost of about $2 per ton. These costs compare very favorably with shop costs on trusses for light work; with the latter design the fabricating costs will range as high as $25 per ton. In addition, more steel will be required.

Field welding on the building was sublet for $350 or $3.18 per ton of steel. This cost compares with a minimum of around $6 per ton for riveting in other types of buildings.

How the column sections were joined in the shop is shown in Fig. 2. At each joint a 6x6x¼-in. tie plate was used on both sides of the web. When the joint had been formed by bolting the tie plates in place, a fillet weld was added along the perimeter of the plates, the bolts removed, the holes filled with weld metal, and the balance of the web and the flanges welded. This procedure eliminated all distortion.

In erection of the steel framework at the site the same procedure was employed.

The use of wood purlins besides reducing the amount of steel makes possible further economies by eliminating the considerable labor involved in bolting the nailing strips to steel purlins. This saving not only lowered the cost but also helped to speed construction of the building.

In addition to the important savings in steel and costs mentioned, the use of welded rigid frames eliminates such items as lateral bracing and kneebraces, which often interfere with the placing of piping, machinery and other equipment. Also the rigid-frame members are easy to clean and maintain against corrosion by painting, the frames appear strong, and their aesthetic qualities are good.

The Dunbar Co., Cleveland, was the general contractor, and City Iron Works, Inc., Cleveland, fabricated the steel. The author was architect and engineer.

Fig. 3. Completed building cost $2.21 per sq. ft. of floor space, including the mechanical trades work and installation of the sprinkler system. Brick work on the street side was made attractive by using light gray face brick with black terra cotta trim and coping.

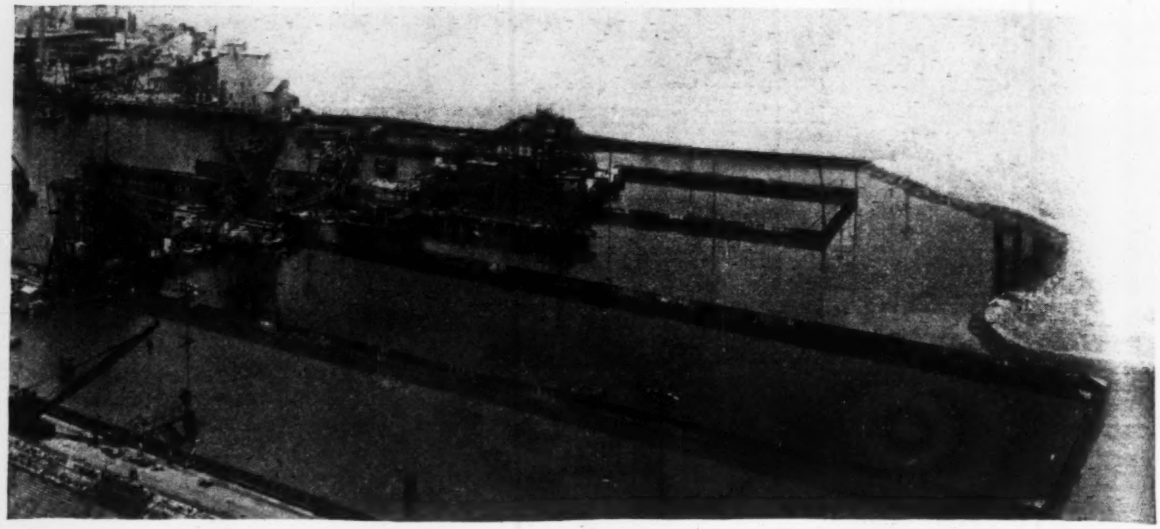


Fig. 1. Tremie barges at work placing wall concrete in two huge shipbuilding drydocks.

Twin Drydocks Constructed Under Water

***Contents in Brief**—Designed to permit the building and safe launching of the largest ships on an even keel, twin drydocks are being built at an eastern navy yard. Most of the construction is done under water; H bearing-piles are driven so their tops are many feet below the surface; huge sections of forms are set on the harbor bottom and more than half a million yards of concrete is being placed by tremie in five and a half months. Concrete is mixed by double-drum pavers and pumped to scows equipped with sliding tremie pipes for underwater placing.*

ADJACENT DRYDOCKS are being built at an eastern navy yard for construction of large ships of war. Supported on steel H-piles, these shipbuilding drydocks are huge concrete boxes with bottom, inshore end and sides of tremie-placed concrete, the outshore end being closed by a floating caisson. Thus a large part of the work is done under water, and what makes the job more difficult, it is located in an area congested with all manner of other construction work that cannot be delayed or interfered with. These drydocks, therefore, constitute a construction job of first magnitude.

Although drydocks have been used for many years for repair and maintenance of ships, it is only recently that the Navy, (*ENR*, March 26, 1942, p. 172) and the Maritime Commission, (*ENR*, July 2, 1942, p. 12; Aug. 27, 1942, p. 293) have built such basins for ship construction purposes. In a drydock a ship can be built on a level keel, which simplifies the framing and assembling of the steel structure and eliminates the time consumed in computations and measurements necessary to insure members being in proper relation to each other as is necessary on inclined ways. The speed of erection is also accelerated as less bolting and bracing are required to hold parts in true position while the riveting or welding is completed. Nor do temporary structural members have to be put into the ship to resist launching stresses as is necessary on way building. Finally, when ships are built in basins, the big guns and superstructures can be installed (limited only by the capacity of the dock cranes), whereas the use of ways requires that the addition of such heavy pieces be postponed until after the ship is launched. Launching from basins merely requires letting water in through tunnels, which are built into the side walls, after which the completed ship merely floats off the keel blocks.

Another advantage of building in a drydock rather than on inclined ways is the simpler and less expensive materials-handling equipment that is required. Full revolving cranes on low gantries can service the ship construction, eliminating the high and elaborate overhead structure used for building large ships on conventional ways. Also, the cranes are on wide-gage tracks and are designed to move around much of the yard, thus reducing the total equipment necessary.

It was because of these advantages that the construction of the two shipbuilding docks described in this article was undertaken. As stated, much of the work was done under water. In detail, this included the driving of hundreds of steel H-piles; sinking and anchoring of bottom and wall forms; and tremie-placing of concrete for the bottom, for the walls up to about 5 ft. below low tide level, and for a pump well located between the docks from which the water level in the docks will be regulated.

From the tremie concrete to above high tide a wall of Z-sheet-piling, embedded 2 ft. in the tremie pour and braced with a steel truss, temporarily prevents water coming over the walls. Concrete for this top section, which contains pipe tunnels and embedded supports and connections for gantry cranes, is added in the dry.

After the structure is pumped out, a 2½-ft. slab is placed over the floor of the dock, this slab containing the drainage system and inserts for attaching the keel blocks on which ships will rest during their construction. A 2-ft. thick layer of concrete is also placed as a lining for the tremie walls.

Dredging and bottom preparation

The twin drydocks are being built in a "made" area adjacent to an existing yard. The excavation, some 2,300,000 cu.yd. of sandy silt, was done with three dipper, one suction and two clamshell dredges. Maximum material moved was about 25,000 cu.yd. per day. The dredges were of varying sizes, the most unusual one being a dipper type with 90-ft. boom and 8-cu.yd. bucket; another had a 21-cu.yd. bucket but used a shorter boom. Material was excavated over the entire site to about 63 ft. below mean low water, and to 72 ft. in a small area. Three cuts, to successively deeper levels, were made to complete the excavation, and material from the dipper and clamshell dredges was loaded on bottom dump scows for disposal in deep water. The suction dredge pumped to an old creek bed where fill was needed. Only serious difficulty encountered was that the machines could not be spudded-up properly as the spuds sunk in the soft material underlying the drydock site.

All but one of the dredges used were chartered from private owners, most of them on a monthly rental basis, and were operated and maintained by the contractors for the drydock. In many cases, however, the owners' crews were put on the contractor's payroll to operate the boats.

After the dredging was complete an I-beam drag was used to smooth the bottom of the trench to a level floor. Over this floor a minimum of 2 ft. of crushed stone of uniform 2 to 3-in. size was placed, and then leveled with the I-beam drag to make the site ready for actual drydock construction.

Driving piles to exact position

The material underlying the dock is soft so that it is necessary to provide piling for support of the structure. Also, considerable uplift pressure is developed in the center area of the dock as it is pumped out and it is necessary that this be counteracted by the resistance of the piles to withdrawal.

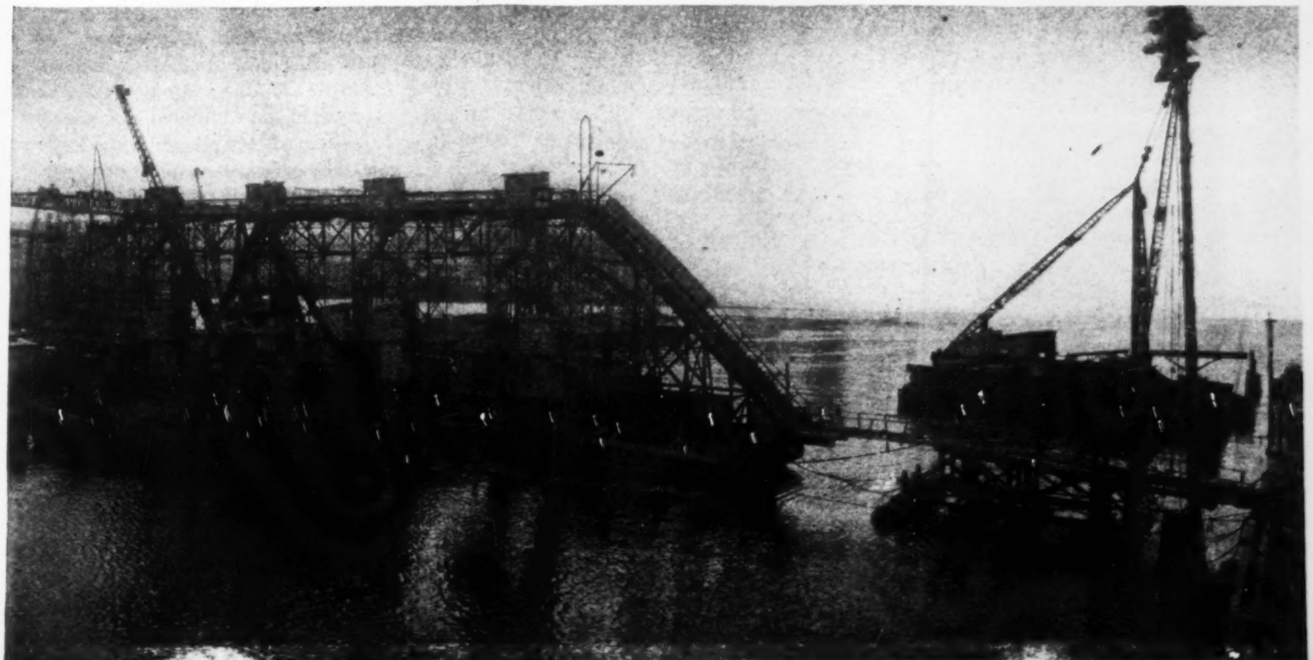
The bearing and uplift piles are spaced generally 5 x 7 ft. apart over the entire basin and are 12 in. x 12 in., H-pile sections weighing 74 lb. per lin. ft. They were driven under water by an inclosed double-acting pile hammer that follows the pile down a telescopic extension of the floating pile driver leads to a depth of 65 ft. below water. Foundation conditions were such that piles varied in length from 30 to 70 ft., and were erratic in behavior, even over small areas. All piles were driven to a 37½-ton minimum bearing according to the *Engineering News* formula.

The use of a form for the tremie seal made it necessary that the piles be driven very close to plan location and elevation to avoid interference with the structural members and the reinforcing in the form, and to provide supports that exactly matched the form bearing seats. In some cases clearance limits were as small as 5½ in., requiring unusually accurate driving when it is considered that the piles go far below the water surface on long telescopic leads. The leads were plumbed by "trimming" the barge and alignment was obtained by adjustment of taut lines to shore points or anchors.

Plan position of the pile was determined from a cable stretched transversely across the dock, at a definite offset from the pile line, with metal tags fastened to mark pile positions. A work float, rigidly attached to the front of the driver and extending several feet ahead of it, had a "bullseye" marked on it for centering a plumb-bob under the cable and thus locating the leads over the pile location. About 300-lb. tension pull was kept in the cable, but on a windy day a transit on shore was used to check against side deflection.

A pile was picked up by a shackle attached through a handling hole in one end and set into the leads. Support of the pile was then transferred to a job-made underwater uncoupling

Fig. 2. Pipelines from the construction pier delivered pumped concrete to four hoppers atop of framework set on barges. Each of these hoppers fed two tremie pipes for underwater placing of the concrete in the bottom and walls of the drydocks.



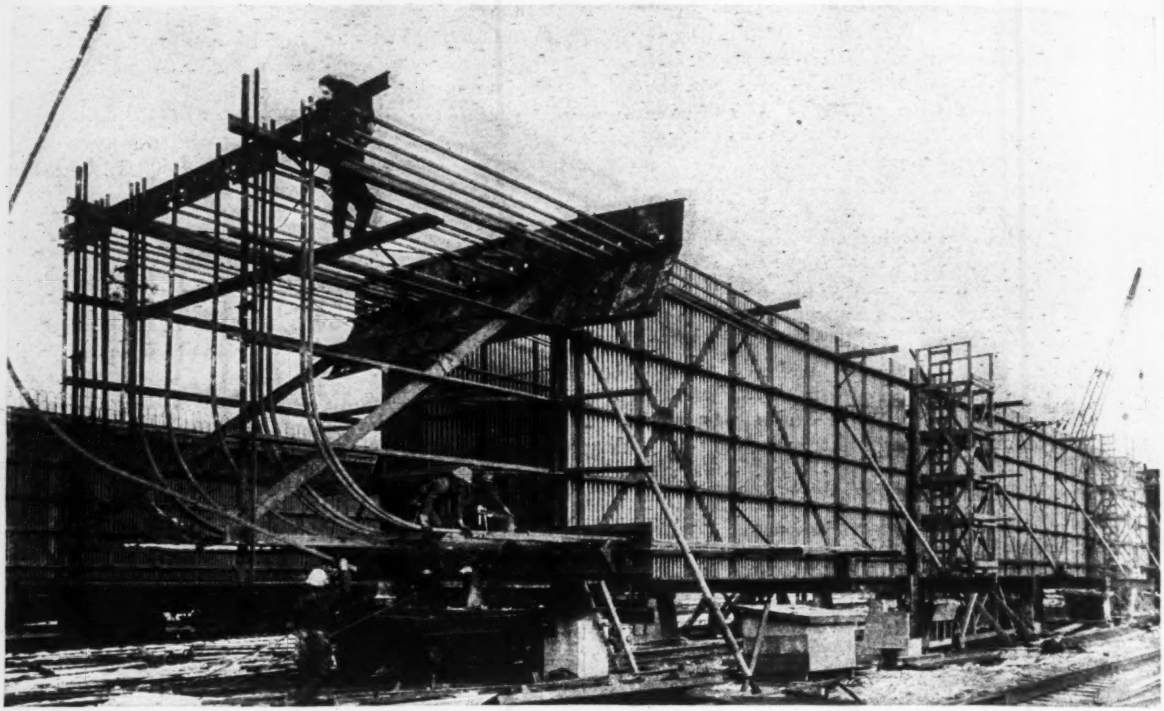


Fig. 3. Trussed forms for the floor sections were fabricated in a distant yard. They were mounted on freight-car trucks so that they could be rolled onto car floats for transportation to the site of the drydocks.

device, a pair of hooked-end tongs that slipped into a slot burned in the pile and held against the load. When the pile was lowered to a point where it was supported by the underlying material the tongs freed themselves and dropped out to release the holding line.

The pile was lowered to the rock blanket, and usually on through it with little resistance, with the hammer following down the telescopic leads to drive it as required. In some cases far more than the design bearing was obtained as an attempt was always made to drive to plan grade to avoid the necessity for underwater cutoff. In other cases the piles reached grade without developing the required bearing. Usual practice in such cases was to drive one or more wood piles between the steel H-piles to consolidate the ground and thus increase the skin friction.

A "tell-tale," reading directly in feet of elevation, was used on the drivers to indicate at all times the depth at which the pile was located. The device used was a cable with one end hooked to the top of the hammer and extending over a sheave at the top of the leads to a graduated plate at the rear of the boat. As the pile was driven, an indicator moved along a bar and blows per ft. or per in. were recorded, thus making every pile a test-pile since a complete log was kept for each. A hand-operated device adjusted the tell-tale for tide variation, changes being made progressively.

Pile positions checked

After driving, the position of the pile top was taken by checking the amount it was out of plan location. This was done by use of a sensitive horizontal bubble in a 10-ft. long straightedge attached to the hammer line while the load of the hammer was supported on the pile but the line kept taut. The line was grasped above the straightedge by a workman and moved as required to bring the bubble to the center. A square "L" frame of wood, clipped to the cable, gave a right angle that could be measured out to the pile location but a correction was necessary to translate the line to the center of the pile as the hammer connection was not exactly centered. In general this method was found to give correct results, the exceptions possibly resulting from slightly uneven pile heads and from tolerances in the leads that permitted the hammer to tip.

Location of many of the piles was again checked subsequent to driving to determine that they would not obstruct form setting. Most successful method for doing this was to locate the driving barge approximately over the pile and send a diver down to fasten a shackle to the handling hole in the center of the web of the pile. The line was then plumbed and checked to the stretched cable as before.

It proved necessary to cut several of the piles underwater. An underwater torch, burning oxygen and hydrogen, was used by divers for this work. A clamp of 2-in. wide steel, made to the H-shape of the pile and brought to the computed elevation by adjusting screws set while the device was above water, was slipped over the pile to give a level guide support for underwater cutting. The water was so dirty that it was impossible for the divers to see from natural light but the torch illuminated a small area while cutting.

Forms for the tremie seal

It was necessary to provide forms for the concrete to be placed underwater, to divide the floor sections into reasonable size pours and to confine the concrete. Also, the design required heavy reinforcement and it was necessary to provide means for holding it in place. The two functions were combined in what is actually a box truss, designed to be picked up at two points and lowered into the water as a single unit. The steel of the truss served as a part of the reinforcing and was supplemented by steel shapes and by reinforcing bars as large as 2 in. square. This structural frame was then enclosed by 3½-in. deep corrugated 18-gage steel sheeting welded on the sides and end (Fig. 3). The form for each unit is a huge box 14 ft. wide and the full height, 20 ft., of the tremie bottom. It is built as long as the full width of the dock and walls, but has a frame at the wall line to separate the section under the walls from that under what will be the open dock, as shown in Fig. 6. Forms were used for alternate 14-ft. wide sections only, the concrete being placed later in the unformed areas. Reinforcing and other appurtenances for the intermediate bays were cantilevered from the adjacent forms.

Forms fabricated in distant yard

The area where the drydocks are being constructed is very congested, so the forms were assembled at a distant fabricating yard, but in the same harbor so that they could be moved by water to the work area. The structural steel was received at the yard partly fabricated, and the units were put together on three flatcars that moved along an aseembly line. Sheeting and other connections were welded on, form ties, reinforcing and other parts added so that the assembly reached the dock as a finished unit.

Cars carrying the section of form were run directly on railroad car-transfer barges and the units jacked-up and blocked to permit the cars to be released immediately for fabrication of another unit. The barge, with a single floor unit or two or more wall forms, was moved by tugs to the drydock site.

The forms, completely assembled with reinforcing, were quite heavy and, as they were long and narrow,

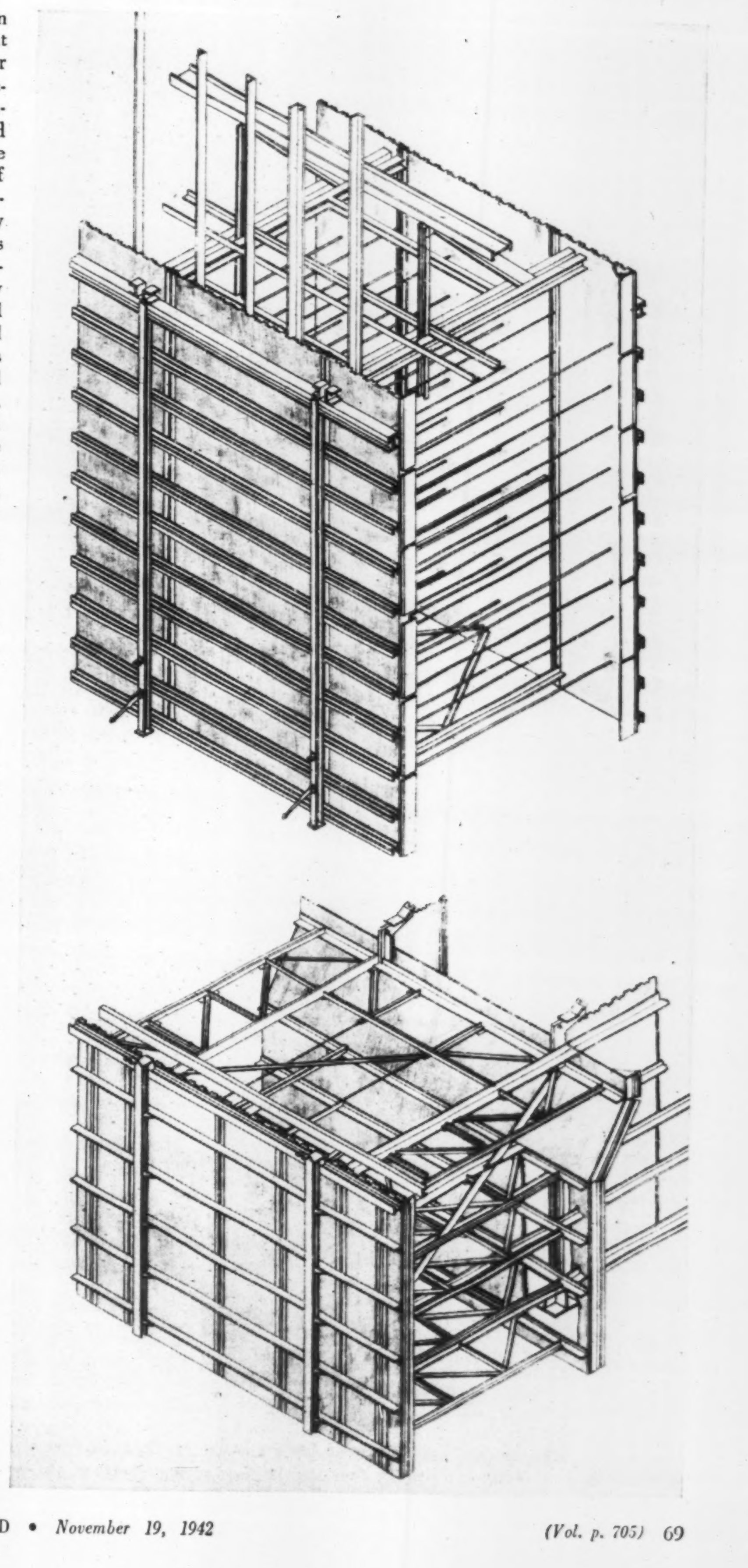


Fig. 4. Tremie forms for the walls (top) and the wall end of a floor form. Bolts on the outer sides of the wall forms are swung down by a diver and are secured to lugs on the floor forms.

proved unwieldy and difficult to set in position under water. A floating naval crane, using a lifting truss from a single point pick-up, was employed for the first trusses but was not especially adaptable to the work. For most of truss setting, three 60x90-ft. sections of an old floating drydock were used, having the sides removed to permit making floating cranes by mounting stiff-leg derricks on them. The cranes are 90-ft.-boom 45-ft.-mast rigs, and readily handled the maximum 210-ton load of the truss form. The two derricks were individually mounted on separate floating sections and could be used singly or together as the work required. The third 60x90-ft. floating section served merely as a spreader to make a rigidly connected unit with the derricks widely spaced as was necessary in setting the long floor trusses.

The derrick boat was moored in position to set a section of form and the car float brought under the booms. After the floor unit was picked up the car float was moved out and the form lowered. Tower guides on the form, put in place while the structure was stable on land at the fabrication yard were lined up by instrument to locate the box underwater.

Divers directed the underwater operation, using two-way communication phones to instruct the surface crew in spotting the unit. Setting was a tedious operation as the form had to be spotted 65 ft. below water to rest on one pile at each of its four corners, within a maximum tolerance of 3 in. horizontally. The tides, wind, passing boats, and dirty water aggravated the delicate job of matching small bearing surfaces.

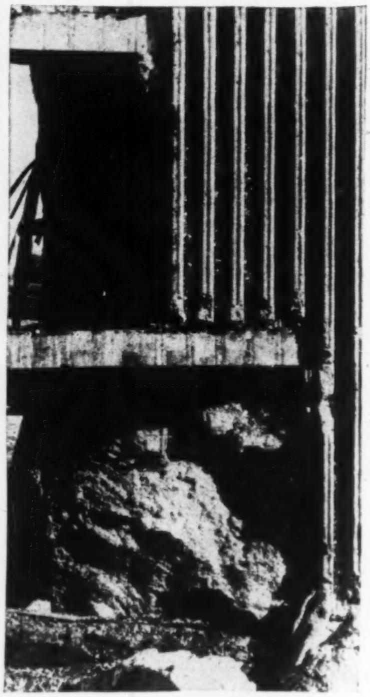


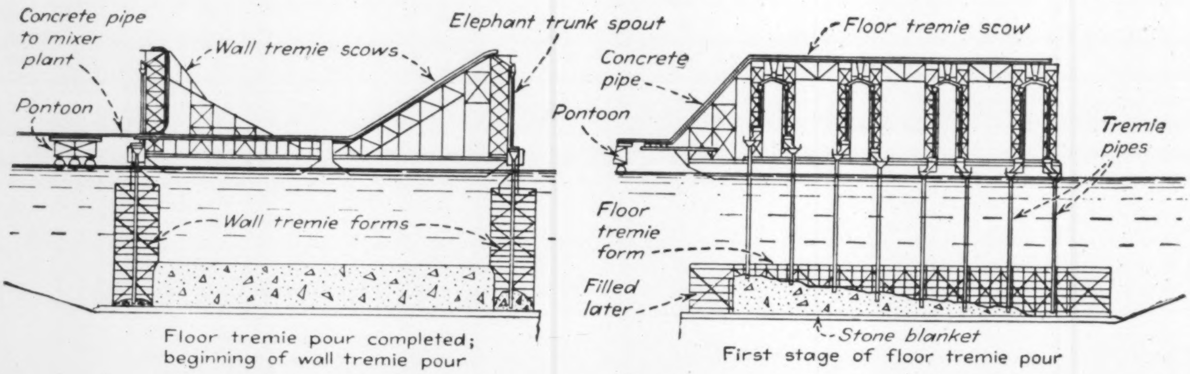
Fig. 5. Test block of concrete poured by tremie under water and then subjected to small dynamite charges to expose the interior. Note uniformity of concrete and absence of honeycomb.

An interlocking section of form to extend the wall inclosure to 5 ft. below the low tide level was prepared to fit over the bottom form. This piece, built in the same yard and transferred in the same manner, was handled in alternate 56 and 28 ft. lengths. It was fastened to the bottom form, with the assistance of divers, with the device shown in Fig. 4. The section of the form under the wall was designed with cantilevered sections at the ends to make it twice the width of the section under the dock. This made the wall form continuous. Bulkheads were arranged so that concrete was placed in [illegible] ft. lengths in the wall.

According to the plans the tremie form rests neatly on top of the crushed stone blanket. Actually, the stone blanket was somewhat disturbed by driving piling through it and major depressions occurred along the edge of the form so that it would not hold the flowing concrete. First, a closed loop of expanded metal lath was attached to the bottom of the form in such a way that as the form was lowered it was expected to spread into a bulb shape and fill the irregularities. This was only partially successful, and windrows of stone along the edges, placed ahead of the form, were tried but they interfered with setting the truss. Next, loose stone placed along the outside of the form box was tried but this also proved slow and unsatisfactory. Bags filled with stone, laid on the reinforcing steel on the truss prior to lowering it into the water, and placed in position by divers gave somewhat better results although progress still was slow. Finally, a canvas flap was developed that had one edge fastened near the bottom of the form along each interior face. A large hem in the other edge held bags of stone. After the form was lowered into place the canvas flap was dropped to seal the joint between the foundation stone and the edge of the form. Although this flap had to be supplemented by some hand-placed bags of stone it was the best of the devices tried.

Much tremie concrete

Biggest production job on the drydocks was placing 500,000 cu.yd. of tremie concrete over an underwater



Floor tremie pour completed; beginning of wall tremie pour

First stage of floor tremie pour

Fig. 6. Concreting of the floor forms was started at one end and the flow of concrete down successive tremie pipes was not started until the flow along the floor had surrounded their bottoms. As a result, any mud on the bottom was pushed ahead of the wave of tremie concrete to the end of the form where it was ejected by an air-lift.

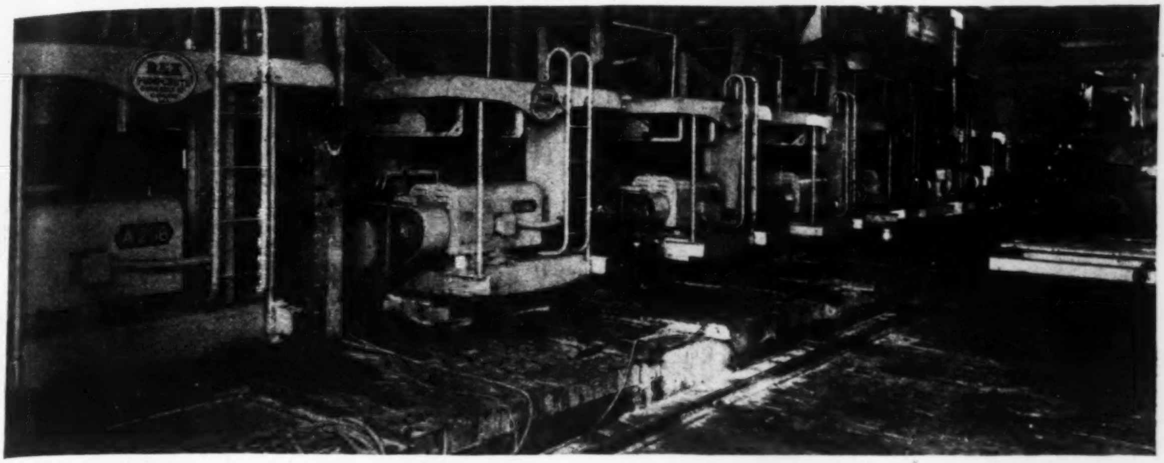


Fig. 7. Seven concrete pumps in a line and a replacement on the transfer car at right made up the original pumping battery for the 500,000 cu.yd. of underwater concrete. An eighth pump was added later.

area of ten acres in about five and a half months time. The concrete placing schedule called for 350 cu.yd. of concrete per hour delivered to floating rigs for underwater placement. To supply this amount of concrete the contractors selected a land plant, with aggregates and cement delivered by barge. Mixing was done in five paver-type double-drum machines and the concrete pumped to specially constructed tremie placing barges. Physical conditions prevented locating the mixer plant centrally for the job and made it necessary to use booster-pumps for part of the concrete placing.

Concrete for the job required 7 bags of cement per yard and was made with one part cement, 1.7 parts sand, 2 parts 1 in. gravel, and 0.45 part of 2 in. gravel. Materials required for 350 cu.yd. of concrete per hour amounted to 440 tons of aggregates and over 600 bbl. of cement; or for a maximum day about fourteen 800-ton barges of aggregates and two 5,000 bbl. barges of bulk cement.

Bins long and narrow

Space limitations prevented use of storage piles of aggregates, so steel bins were installed. The storage bins are long and rather narrow with a 175-ft. face along the dock where two barges can be unloaded at one time by two cranes. The capacity of the bins is 2,800 cu.yd., divided into 350 cu.yd. compartments, each feeding onto a belt conveyor for delivery of the aggregates to the nearby mixer plant. An auxiliary hopper near the storage bins makes it possible to unload aggregates from a third barge for capacity production, the material being carried to the bins by a belt conveyor.

Bulk cement is picked up from the deck of the cargo barge and blown about 200 ft. to a 3,000 bbl. cement storage bin by a remote-control cement unloader. Two rotary feeder disks, flat on the floor, deliver cement to a screw conveyor feeder that carries a constant amount of cement to a point where it is boosted through a pipe by hot, low pressure air and conveyed to the bin. Supplementing barge delivery, some cement comes to the work in air-activated steel containers to which air pressure is applied to blow the cement through a hose and pipe to the cement bin.

Batching to five mixers in a row requires a long bin with aggregates available along its full length. Compartments for sand and two sizes of aggregates are made by longitudinal partitions in the bins and the aggregates are fed into them by a reversing, short distributing belt that takes material from the main conveyor and discharges over either of its ends as required. Installation of two transverse partitions to divide each longitudinal compartment into three bins was required to stop segregation of the coarse aggregates. A chute from one discharge point fills the center bin.

Batteries of mixers and pumps

The mixers are arranged so that each is charged by individual aggregate, cement and water batchers. The aggregates are weighed manually on individual beam scales, while cement and water are automatically weighed, using electric shut-offs. Discharge from the batchers to the mixers is electrically controlled to a definite cycle. Water goes first, 6 sec. later the aggregate is released and in 2 sec. more the cement discharges. Water, discharging through a 5-in. dia. pipe, is slowest, but all materials are in the drum in about 11 sec.

Five electric-driven 34E double-drum mixers are located in a line directly under the batcher floor. These machines are rear charging non-tilting mixers of the type developed in recent years for fast moving paving work, and were selected here also for the yardage they can produce. They mix a 1¼ cu.yd. batch on an overall 57½ sec. cycle or roughly 75 cu.yd. per hour.

Eight concrete pumps

Concrete is delivered from the mixers directly to the agitator hoppers of double cylinder concrete pumps, located immediately below them. Each mixer can deliver concrete, through a chute system, to all or any one of the three pumps nearest it. Eight pumps (seven during the early part of the work) are installed at about ground level on the floor below the concrete mixers and a spare pump is kept ready for exchanges. These machines are on flanged wheels and rails, and so arranged with a transfer railway that a pump in need of repair can be taken out of pumping position and quickly replaced. Pumps are overhauled after 3,500 cu.yd. of pumping. An improvement on the pumps that helped reduce difficulties in distant pumping is use of a uniform 8-in. dia. siamese Y con-

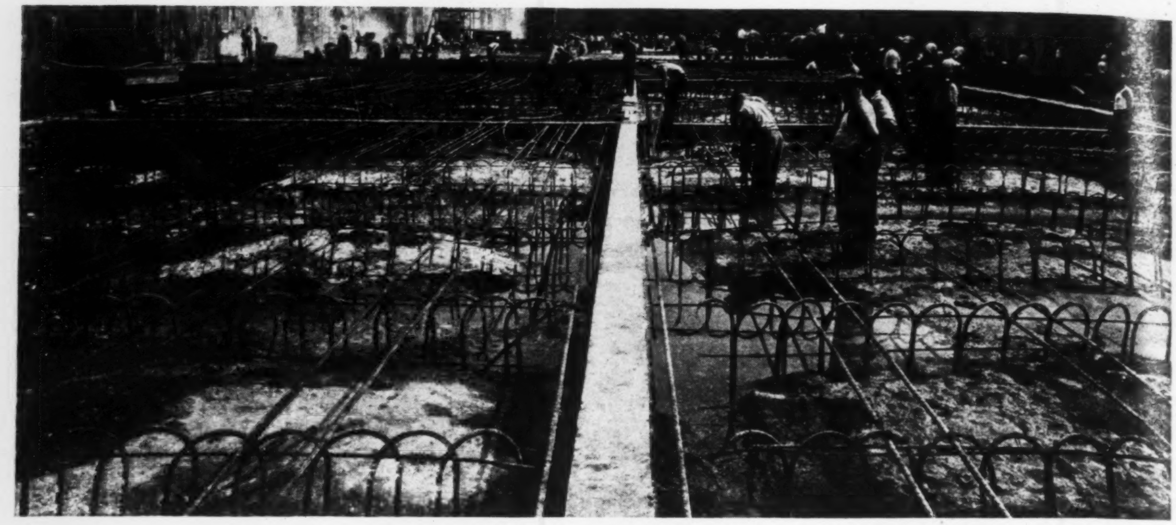


Fig. 8. Surface of tremie concrete in drydock after preliminary cleaning with air and water jet. Note that only small hummocks mark location of tremie pipes during placing. Loops bond dry-pour to tremie concrete.

nection from both pump cylinders to the single pipe-line. Apparently, operation is much smoother than that with an enlargement to 10 in. at the Y followed by a reducer to an 8-in. dia. pipe.

Concrete pumped to tremie barges

Concrete is delivered by pipeline, a maximum horizontal distance of about 1,100 ft., to special barges equipped for tremie placing. However, the added resistance to pumping of bends and vertical rises of the pipe makes the power required equivalent to a 1,600-ft. length of straight, horizontal pipe.

This distance is beyond the consistent pumping capacity of a single machine so a booster plant of the same double-cylinder pumps was established. The booster machines receive concrete from the pipelines discharging into the agitator hopper of the pump. These machines then work as entirely independent units, pumping the concrete to the point of placement.

The concrete pipeline follows a construction pier roughly parallel to the length of the docks and at one side of the two docks as shown in Fig. 1. At a point opposite the position where concrete is to be placed the pipelines turn and are laid over the water on pontoon floats to the booster pumps or direct to the placing barge. The pipe is 8 in. dia. in 10-ft. sections with quick-acting toggle couplings. Fabricated fixed-radius bends are used for most changes of direction in the line but where the line may swing either vertically or horizontally, due to tide or other movement, flexible joint sections of a steel slip-sleeve type are employed.

Generally four pumps are used for concreting the floor area of the dock and three or four for placing in two sections of wall, all going on simultaneously. Four pumps require about 9 hr. to make a floor pour of about 1,664 cu.yd. Average time for the two simultaneous wall pours is 21 hr., for about 3,500 cu.yd. of concrete.

Concrete is placed under water from special equipment mounted on barges, the two placing plants for the tremie concrete of the dock floor being mounted on railroad car floats. Concrete pipelines are carried up a sloping frame on the barge to a platform supported on pipe framework about 40 ft. above the deck. The framework that supports the platform is made up of towers of builder's type hoists that carry a sliding frame on the front from which tremie pipes are suspended.

The concrete from the pipelines is discharged into four 2½-cu.yd. hoppers, each of which feeds two tremie placing pipes. Concrete passes through elephant-trunk spouts to a funnel-shaped hopper top on the tremie pipes and the hopper and suspended pipe is varied in height to accommodate the discharge level required for tremie placing. Sections of the elephant-trunk chute are removed as the concrete rises.

The elevation of the hopper, and consequently the discharge end of the tremie pipe, is controlled by a line from a four-drum gasoline-powered hoist that handles four of the tremies. An operator riding each of the sliding frames at the lower hopper level watches the flow of concrete and, with electric light controls, signals a gate man at the larger hopper above for any change in the rate of flow. The gate man regulates the flow to two tremie pipes and handles signal controls to the concrete plant. Similar signals to the hoist operator govern raising or lowering of the tremie pipe in the form.

Flowing concrete required

A slump of about 8 in. is desired in order that the tremie concrete will flow in closely around the piling and produce a nearly level surface. The high slump is not especially desirable for pumping as the grout sometimes fails to coat, and thus lubricate the gravel particles with consequent plugging of the pipeline. Test pours of the concrete and extensive borings show little segregation and indicate good strength and impervious characteristics.

In starting a pour at any pipe two of the concrete pipelines are directed to feed into one tremie. Both hoppers are filled with concrete to assure a heavy, constant flow while starting the pour. A plug made of a plywood disk, covered with a canvas seal and having vertical fins to prevent its turning in the pipe, is used ahead of the concrete as each pour is started to eliminate a rush of water that might wash the cement from the aggregate. The plug, held by a cable, is progressively lowered and is completely released when there is a 30 ft. column of concrete in the tremie pipe, sufficient to provide a seal at its outlet. The concrete is continually discharged into the pipe, which is raised as the form below becomes filled.

Pours on the dock bottom are started either at one end or near the center of the monolith and other tremies are not used until concrete to a depth of a foot has flowed to the adjacent pipe, pushing any silt on the surface ahead of it to a corner where it can be ejected by an air lift.

Constant soundings are made during a pour, using a lead weight on a depth-marked sounding line operated from a floating platform ahead of the tremie barge. Concrete, of the characteristics used, takes a slope under water of about 1 on 9 leaving minor undulations in the concrete surface, but these are leveled out in the 2½-ft. thick slab placed after the dock is unwatered.

Placing wall concrete

The wall concrete is poured by similar methods, but here two tremie placing devices on each of two barges are used, wall sections on opposite sides of the dock being placed simultaneously, with each barge served by two pipelines. A 42-ft. long wall monolith is started at one end, and any muck on the bottom is forced to the other end by successive starting of tremies after the concrete from the first pipe has passed the foot of the next. As concrete rises the pipes are lifted to the top of their run, and then placing is suspended while a 20-ft. section of pipe is removed. This does not break the seal as the top of the pipe is out of the water and the concrete around the foot prevents the pipe emptying so that it might take water.

The outer end of the dock requires a closing gate of the floating caisson type, and thus will be somewhat slower in construction than the rest of the unit. To permit early use of the inboard end a temporary cofferdam is constructed across the width of the dock and this section immediately finished. The temporary cofferdam is a single row of Z-sheet piling imbedded in the tremie seal and braced at two levels by a steel frame using heavy diagonal members anchored in the concrete.

The outer end of the dock will be enclosed by a rodded double wall sheetpile cofferdam set on a tremie poured bottom and tied into the walls. The gate seals and other special work can then be done in the dry.

Interior Finish

The 2½ ft. finished floor over the tremie seal of the dock is placed by pumping concrete to the edge of the drydock and dropping it through elephant-trunk spouts to hoppers on the drydock floor for final distribution by concrete buggy. Blocks about 37x57 ft. are placed checkerboard pattern over the dock floor. The surface of the tremie concrete is cleaned of all unsound concrete by paving breakers and an air and water jet. Reinforcing is set, and is followed by placing of inserts to hold the keel blocks on which a ship will be supported while being built or under repair. The inserts are cast iron sections 4 ft. long and weighing 180 lb. They are brought to exact grade by setting them on bolts with coarse screw threads and are then welded to prevent movement while pouring concrete.

Forms for the 2-ft. thick veneer on the walls are lacquered plywood panels 14 ft. wide, the full height of the dock and are set in units to give a convenient length for concreting. Neither the corrugated sheeting nor wales are removed from the inside of the tremie poured walls, and the veneer form is fastened to the wales with coarse bolts threaded into coiled-wire threads in lieu of conventional nuts. Concrete for the wall veneer is also delivered by pipeline and dropped through elephant-trunk spouts.

Personnel

Design of the structure described was prepared by Drydock Engineers, a combination of the firms of Parsons, Klapp, Brinckerhoff & Douglas; Proctor, Freeman Mueser; Frederick R. Harris, Inc.; and Fay, Spofford & Thorndike. Rear Admiral Frederic R. Harris (CEC) USN (retired) heads the group.

Construction of the drydock is being handled by the combined firm of Walsh Construction Co., J. Rich Steers, Inc., Cauldwell-Wingate Co., and the Raisler Corp., operating under the name of Contractors for Drydocks. John S. Macdonald is project manager for the combined firms.

The work is being done for the Bureau of Yards and Docks, U. S. Navy, under the general direction of Admiral Ben Moreell (CEC) USN, chief of the bureau and is supervised by officers of the Civil Engineer Corps of the Navy.

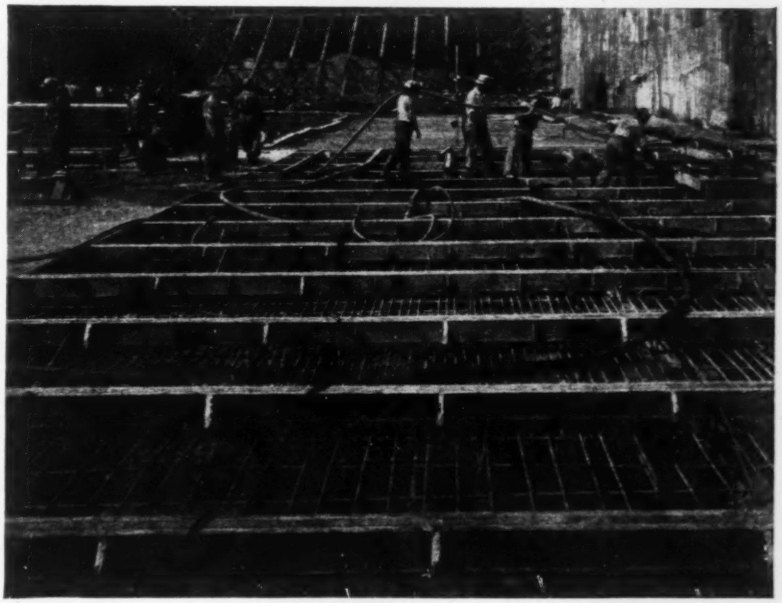
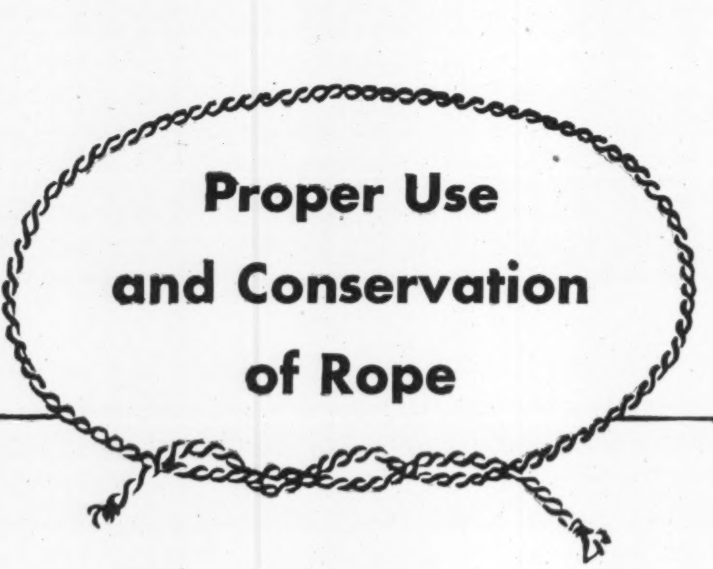


Fig. 9. Keel blocks for shipbuilding are supported by special inserts adjusted to exact location by rapid-thread bolts, which are then welded to embedded reinforcing to assure final position.



Proper Use and Conservation of Rope

***Contents in Brief**—There will be no new manila rope for the duration. Present program for conservation is to ration available stocks to last through 1943 and substitute sisal and henequen while raising new crops locally. Sisal has 75 percent the strength of manila, henequen about 60 percent; a factor of safety of five is recommended for all rope used on construction.*

NORMAL SOURCES OF FIBER for manila and similar rope and twine materials have been cut off making it imperative that: (1) all rope be carefully handled to preserve it, (2) other fibers be substituted for those from the Philippines and Dutch East Indies, and (3) new sources of fibers be developed.

For the duration of the war, at least until the Japanese can be driven from the southern Pacific Islands, the United States—in fact the United Nations—will have to rely on the following sources of material: Fibers on hand, stocks of which are not large; continuing shipments of sisal from British East Africa, Portugese East and West Africa, Madagascar and Haiti; henequen fibers from Mexico and Cuba; and miscellaneous hard fibers, mainly sisal, from the Bahamas, Mexico and Central America. With these few facts as a background it seems essential that all users of rope be informed of the best methods of use and care for the fibers available. The following data may be helpful.

For the substitutes now available minimum acceptable tensile stress under test has been tentatively fixed at 75 percent the strength of manila for sisal rope and at 60 percent for henequen. Actually the strength of these fibers when new and in good condition may be somewhat in excess of the minimum specification, but it is expected that this material will deteriorate more rapidly so the lower value is used. These stresses are in conformance with an emergency alternate federal specification for manila rope.

A factor of safety of five has long been considered proper for manila rope, as used by the construction industry, and this figure can be properly accepted for sisal and henequen with the lower strength values ascribed to them. The factor of five should be used with judgment as it leaves a relatively small margin for errors in estimating weight of the load, pulley friction, jerky hoisting and wear.

An accompanying table gives minimum test values and permissible working loads for manila, henequen and sisal. It may be noted that henequen or sisal rope with a diameter ¼ in. larger than that of manila will have as good a working value as the better rope up to 1½-in. dia. sizes. The values in the table do not apply for power transmission or for rapidly running ropes.

A simple rule to obtain approximate working strength of manila rope when tables are not available is to multiply the square of the diameter of the rope in eighths of an inch by 20. (From *Safety and Economy in Heavy Construction* by R. J. Reigeluth, McGraw-Hill Publishing Co., p. 46.) Thus for a ⅝-in. rope; 5 squared is 25 and multiplied by 20 is 500 lb. This gives substantially lower values than shown in the table and is probably safe for use with worn manila rope or for new sisal, but for henequen brings the safety factor below five.

How to identify fibers

A good manila rope is light yellow in color, hard but pliant with a silvery luster and a smooth waxy surface. Sisal fiber is whitish, rather coarse and brittle so that the rope feels harsh to the touch. It is most familiar as a whitish wrapping cord sometimes used for express packaging. Henequen is the material used for binder-twine but only experts can distinguish it, by visual inspection, from manila fibers especially after it is a little worn, so unusual care must be exercised not to mix the two types of rope.

Rope construction

A group of fibers, twisted into a yarn, forms the unit of rope construction. A number of yarns are twisted left-handed into a strand, three or four strands laid right-handed make up a finished rope. If the strands are tightly twisted the rope is "hard-laid," stiff and resistant to abrasion and more durable. More loosely twisted "soft-laid" rope is stronger when new.

For most purposes manila rope is made up of three strands, but where abrasion is a factor a rope having four strands laid around a core is recommended. The latter type is more nearly round in cross sections, and although its strength is somewhat less than three-strand rope of the same size, it is used extensively for power hoisting.

Up to 1-in. a rope is specified by diameter size. Larger sizes are designated properly by the circumference, assumed to be three (not pi) times the diameter. However, on construction the latter convention is generally ignored and the diameter used to designate all rope.

Protect your rope

The lower strength and more rapid depreciation of sisal and henequen fibers are an incentive to get the longest possible service from present stocks of manila. One conservation possibility is to reserve the manila for scaffold work, bosun's chairs and special rigging jobs where human life or valuable equipment is in danger.

Care should be exercised in opening new rope to avoid kinks. Pulling out kinks causes severe damage as it overstresses the fibers at the sharp bend. When rope is cut, yarn or cord whippings should be applied at once to prevent the strands from becoming unlaid. If one strand slips with relation to the others the loads will be unevenly distributed and the rope life will be shortened.

When attaching a rope to a hook, ring or pulley block, a thimble should be placed in the loop or eye to reduce wear on the rope and decrease stresses developed in the rope from bending around a small diameter. When used as a sling the rope should be padded where it passes over sharp edges. Rope should not be dragged over concrete, or through sand or cinders, as small particles of gritty material get between the strands and cause internal damage that is added to the abrasion on the outside surface.

Rope should be stored where it is protected from the weather and away from all sources of heat that cause natural fiber oil to dry out. It should be kept away from dampness and moisture yet should be placed where air circulates freely. If the rope becomes wet, it should be hung up to dry and not allowed to freeze as this seriously injures fibers and reduces the strength. Frozen rope has only 60 percent of its strength when dry. Acids, chemicals and many fumes are harmful to rope, exposure to chimney flue-gas being particularly detrimental to substitute fibers.

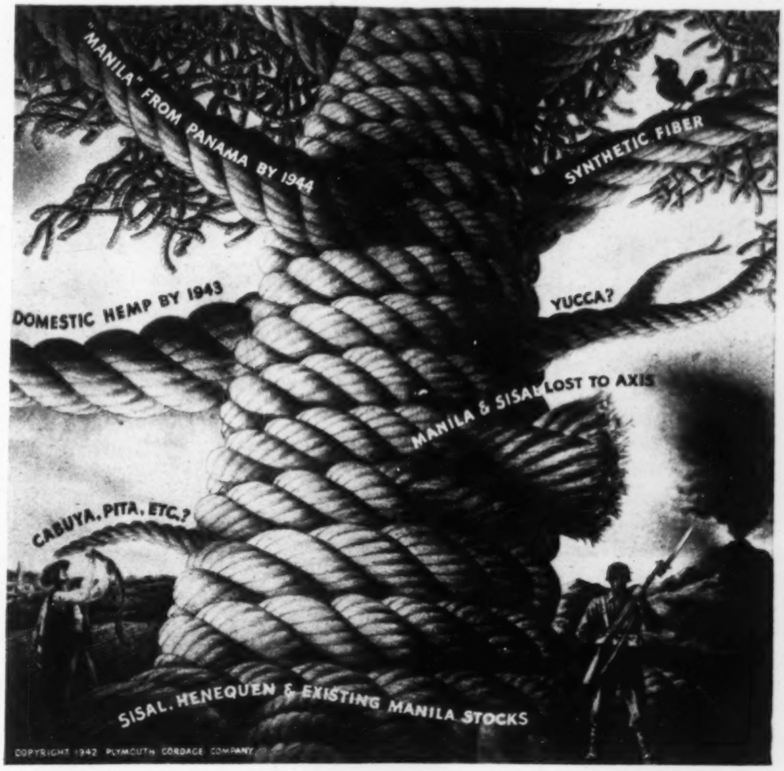
Inspect rope regularly

Inspection to estimate loss of strength of worn rope requires more than casual examination. Every foot of the outside yarn should be inspected visually for broken fibers, keeping in mind that every failure represents a proportionate loss of strength. Opening up the rope by untwisting the strands permits observation of its internal condition. The interior should be as bright and clean as when the rope was new. Internal broken yarns or a sawdust-like accumulation of powder inside, indicate excessive internal wear between strands.

If the rope is large enough, open up a strand and try to pull out one of the inside yarns. In rope that has been overloaded the interior yarns will have failed first. Four-strand rope, laid around a heart, shows serious deterioration when the heart can be pulled out easily in short pieces. Failure of the internal strands or the heart should be cause for prohibiting use of the rope on hazardous or important work. If the inside of the rope is dirty, if the strands have begun to unlay, or if a rope has lost its "life" and elasticity, it should not be used for hoisting. Such rope will not divide the load evenly among the strands and it will have a short and dangerous life.

If the outside surface of the rope feels dry and brittle, or shows indication of having been in contact with a hot pipe, or having been discolored by acid fumes, it should be discarded. A condemned rope should be plainly marked with paint or cut up into short lines that cannot be used for hoisting or other work where loss of life or property would result from its failure.

A program of supply for future American needs includes the planting,


"MANILA" FROM PANAMA BY 1944
SYNTHETIC FIBER
DOMESTIC HEMP BY 1943
YUCCA?
MANILA & SISAL LOST TO AXIS
CABUYA, PITA, ETC.?
SISAL, HENEQUEN & EXISTING MANILA STOCKS
COPYRIGHT 1942 PLYMOUTH CORDAGE COMPANY

Drawing courtesy of Plymouth Cordage Co.

The rope family-tree is having new branches grafted on it as sisal, henequen, domestic hemp, and other fibers are planted in Allied controlled countries to replace the manila and other fibers lost to the Axis. Synthetic fibers are also a possibility though details are withheld.

BREAKING STRENGTH IN POUNDS FOR ROPE AND WORKING VALUE AT FACTOR OF SAFETY OF FIVE.

Rope Size, inches		Manila		Henequen		Sisal	
Dia.	Circ.	Breaking	Working	Breaking	Working	Breaking	Working
¼	¾	600	120	360	72	450	90
⅜	1⅛	1,350	270	810	162	1,025	205
½	1½	2,650	530	1,590	318	2,000	400
⅝	2	4,400	880	2,640	528	3,300	660
¾	2¼	5,400	1,080	3,240	628	4,050	810
⅞	2¾	7,700	1,540	4,620	924		
1	3	9,000	1,800	5,400	1,080	6,750	1,350
1¼	3¾	13,500	2,700			10,125	2,025
1½	4½	18,500	3,700			13,875	2,775
1¾	5½	26,500	5,300			19,875	3,975
2	6	31,000	6,200			23,250	4,650
3	9	64,000	12,800			48,000	9,600

during the past season, of 30,000 acres of American hemp (*Cannabis Sativa*) for seed. This will be expanded into 300,000 acres of planting next year in the corn lands of the Mid-Western States. The crop is expected to produce 800 to 900 lb. of fiber per acre. This type of fiber is the true hemp from which cordage has been made for centuries and will produce rope fully as good in quality as the best manila.

It has not been raised in large quantities in recent years as it could not compete economically with fibers from other sources. Actually the rope fibers we have been securing from the Philippines are not hemp but abaca, from the wild banana tree.

The U. S. Government has promoted plantings of abaca in Panama, Costa Rica, Honduras and Guatemala to the extent of 15,000 acres, which is expected to yield 1,300 lb. per acre. New land will be planted to sisal in Haiti and henequen in Cuba.

Yucca, a U. S. desert plant, cabuya from Equador, pita from Colombia, caroa and other wild plants of Brazil are being tested for possible use.

Laboratory work is being done on development of synthetic rope. Details are secret, though results are said to be promising, but no great quantity of synthetic rope can be expected for civilian use in the immediate future.

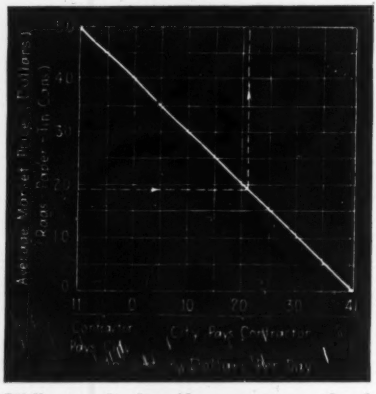
Substantial quantities may be expected from these sources late in 1943 and plants are planned for early construction to process the fibers into rope. For the present, however, it is essential that everything possible be done to conserve fiber rope if war needs are to be met.

Inspect and conserve rope; do not overbuy to hoard!

Salvage Value of Materials Fixes Sacramento Garbage Disposal Fee

GARBAGE DISPOSAL at Sacramento, Calif., averaging a little over 100 tons per day, is now "under new management" by reason of a five-year contract recently drawn up between the city and the Sanitary Disposal Co. The new plan employs the fill-and-cover method and replaces disposal by feeding to hogs which was followed for many years. A feature of the new contract is the sliding scale whereby the city will pay the contractor or will be paid by the contractor according to the current average prices of materials salvaged.

The hog farm where garbage was delivered by city trucks until July, 1942, required an average 12-mile haul. In the absence of adequate dumping facilities trucks were often bogged down in the dumping grounds and the cost of truck maintenance was very high. Sanitary conditions at the hog feeding grounds were bad.



Sliding scale, based on average of salvage values, determines price paid.

Under the new plan of disposal, the average haul is only about six miles and the contract calls for a paved area on which the trucks can dump, usually to a lower level, without the necessity for moving into or over material previously dumped. Thus there will be saved some 12,000 truck miles per month and much of the former costs for truck maintenance.

Earth fill method used

The disposal contractor is using hand salvage methods (until installation of a proposed conveyor belt can be arranged) and after being picked over, the garbage is covered with earth excavated from an adjoining area where filling will next be carried on. The site of an old brickyard, where the fill is being made, is expected to afford space sufficient for the city's garbage disposal for about five years.

The scale on which the city pays for the garbage disposal is determined according to the accompanying chart. The current market price of three principal salvage items, rags, paper and tin cans, as quoted on the San Francisco market, on the last day of each month, is averaged and this average fixes the point on the chart directly below the daily rate of pay for the ensuing month. Thus as the price of these salvaged materials goes up and the contractor gets a greater return from salvage, the cost to the city decreases. As the chart shows, the rate can decrease to zero and thereafter the contractor pays the city at rates ranging up to $11 per day. Thus the widest possible range is from a maximum of $41 per day, paid to the contractor by the city, to $11 per day, the maximum rate of pay from the contractor to the city. This price is a flat rate of daily payment regardless of the quantity of garbage delivered.

City delivers to dump site

The contractor takes responsibility for any "high grading" or other losses that may occur after the garbage is on the trucks, but the city does the hauling and delivers to the dumping site. At prices current when this was written the average rate for the three salvage items was about $19 per ton and, consequently the city was paying the contractor $21 per day.

Wartime Maintenance of Facilities for Sewage Disposal

Operation and maintenace of sewage disposal facilities under wartime conditions was the theme of the Federation of Sewage Works Associations' conference held in Cleveland on Oct. 22-24. The following are extracts chosen from papers presented at the technical sessions. In addition to the discussions relating to new problems created by the war, there was one research paper that outlined the results from an investigation of sewage treatment by means of a flotation process. Also included is a tabulation showing the extent of use of critical materials in the operation of sewers and treatment plants. A news account of the meeting, with the names of newly-elected officers was published in the Oct. 29 issue, p. 602.

WHAT WE HAVE EXPERIENCED to date, particularly in shortages of manpower, is only a patching to what the future appears to hold in store. There are less than sixty million workers in the United States. With eight or ten million in the armed forces, and thirty million in war industries, the remainder, 20 or 22 million, mostly second-grade physically or beyond the age limit, must be prepared to accomplish all essential activities in the nation. It is not too early to seriously consider the use of female workers in sewage treatment plants and pumping stations. Manpower is the most serious problem confronting us, and it is a problem that cannot be solved by requesting deferments for men now operating the plants.

As to materials, there do not appear to be very many that can be taken from sewerage practice that have not already gone. Building—except for repairs—will stop entirely. While public health will be protected, some nuisances are going to be created and tolerated. Public health is not yet in danger, nor is it believed that it will suffer greatly from restrictions already imposed upon sewerage administrators. To a material extent, sewerage improvements, particularly treatment works, are constructed and operated to prevent nuisance and not because of proven menace to health.

There will be some public discomfort for the next few years because of nuisances, but it is not conceivable that national authorities, guided in their thinking by the U. S. Public Health Service, will, at any time, permit sewerage conditions in this country to reach a situation where public health will be threatened.

Difficulties attendant upon the migration of population following the construction, operation and maintenance of war industries, have been confined quite largely to the smaller cities and to areas where sewerage was lacking or stream pollution hazardous. It can be stated with considerable pride that care has been exercized by the Army in protecting the environs of newly constructed cantonements and war industries by providing adequate sewerage.

Sewage characteristics have changed to some extent because of speeding up of manufacturing processes and because limited personnel has rendered impossible the inspection of tributary industrial waste. Manufacturing firms have grown careless and inconsiderate of the service which is being afforded by adequate sewerage. Constantly urged to greater production, they sacrifice almost anything to operate at greater speed. Metal works, plating and pickling industries, packing houses, canneries and allied food processing plants are operating at unusual rates, and sewerage is taking a pretty strong jolt because of lack of exercise of ordinary care in plant waste disposal. *—A. M. Rawn, chief engineer and general manager, Los Angeles County Sanitation District, Calif.*

Discussion—The continued war effort is retarding the normal construction program of sewage plant building, both of new plants and improvements or enlarging of existing ones. It is altogether likely that this deferment of construction will extend for an indefinite period into the future because, as materials again become available, financial problems will likely retard municipal improvements of this nature. Federal assistance in the form of Public Works Program may alleviate this postwar condition to a considerable extent.

Contributions of large volumes of new types of industrial wastes have created treatment problems. In many instances, such new wastes have dominated or entirely changed the character of the raw sewage previously coming to disposal plants and have upset the efficiency of treatment. As a result, many receiving streams are becoming more seriously polluted and forced to carry loads far beyond their capacities for recovery. The Public Health Service has assembled factual data on the nature and volume of waste to be anticipated from the manufacture of specific types of munitions. This information is available to states and interested persons having to deal with these problems.

One gratifying result of the national emergency has been the provision of adequate sewage treatment facilities for practically all of the military areas where there are material quantities of waste, either domestic or industrial. The necessity of maintaining the safety of sources of public water supply and of avoiding overloading of streams by excessive pollution was generally appreciated by the construction forces of the military departments. In many cases, state health departments were active in stimulating interest in these essential sanitation problems, and because of their accurate knowledge of local conditions, were able to advise concerning the specific requirements to be met in individual cases.

Another beneficial result has been the provision of federal funds through the terms of the Lanhan Act. Under this authority, urgently needed sanitation facilities have been or are being provided in many areas where the war activities have overwhelmed normal municipal functions. As of Aug. 31, 1942, allotments of funds totaling over 43 million dollars, have been made for 129 sewerage projects, 18 treatment plants and 73 projects comprising both sewerage and sewage treatment. Of these allotted projects, 132 are under construction or completed, embracing a total of 67 treatment plants, either separate or combined with sewerage facilities.—*J. K. Hoskins, senior sanitary engineer and chief, sanitation section, U. S. Public Health Service, Washington, D. C.*

Sewage treatment at army posts

Generally speaking, design and operation of Army sewage treatment plants is in accord with the original plan for temporary facilities. Operating experiences so far has not shown that it is desirable for the Army to standardize on any one type.

Nineteen posts have Imhoff tanks. Those tanks at southern air-corps stations that are followed by sand filters are producing good results.

With one exception all the activated sludge plants are east of the Mississippi. All but two plants have been operating satisfactorily; in one of the two plants, chlorination of the return sludge at the division box has eliminated bulking troubles.

About 63 contact aeration (Hays) process plants with two-stage aeration and intermediate settling have been or are being constructed; they are located in the 4th, 7th and 8th service commands. Very few are designed alike and studies are being made to discover the best method for operating the plants.

Originally the plants were small, for populations under 5,000. Designs were suddenly jumped to 26,000 and then to 40,000 without adequate operating data with Army camp sewage. Operating reports show only four plants are giving continuous performance in accordance with expectations. It is believed that the disappointing results are due to one or all of the following: (1) Unbalanced or poor design; (2) mechanical difficulties; and (3) inexperience of operators and lack of control equipment.

There is one fact that may vitally affect the functioning of the Hays process. Mr. Hays always maintained he desired a short primary detention period in the primary tank. The capacity factors now in use by the Army to care for increased populations at posts prohibit short detention periods. It is possible that a shorter settling period or fine screening only might aid in plant performance.

In comparing operating results from biofilter plants it is observed that single-stage and two-stage plants treat Army sewage with about the same percent B.O.D. removal at design loading. To save critical materials, it is possible that the Army can eliminate two-stage plants and have the single stage plants designed for dual recirculation.

All types of high capacity filters have shown filter-fly breeding, and flooding and chlorination is being practiced extensively for control. Another disappointing feature of the high capacity filter is the discolored effluent, usually with a reddish brown tinge. Unfortunately riparian owners are more impressed by a turbid effluent than they are with the analytical data—*Lewis H. Kessler and J. T. Norgaard, chief and associate sanitary engineer, Water, Sewer and Services Unit, Repairs and Utilities Branch, Office of the Chief of Engineers, U. S. Army.*

Materials for maintenance

At the request of the War Production Board, the Federation of Sewage Works Associations distributed questionnaires to 100 municipalities requesting information on the use of critical materials in the operation and maintenance of sewer systems and treatment works.

From data received from 56 cities, the analysis shown in the accompanying tabulation was made by George J. Schroepper, chief engineer and superintendent of the Minneapolis-St Paul Sanitary District, St Paul, Minn.

In making this available for publication the federation wishes it to be understood that the data are neither complete or final, and that the figures are subject to upward revision.

Treatment by flotation

Recent investigation of the possibility of sewage treatment by a flotation process in which chemical reagents were used to promote flotation, produced results that may justify further research.

Flotation of suspended and colloidal solids is accomplished by the attachment of the solids to rising air bubbles which buoy the solids to the surface where a froth or foam is formed. To facilitate the attachment of solids to the air bubbles and the formation of a froth it is necessary to add a flotation agent. Flotation reagents are mainly heterpolar organic compounds.

A large number of reagents are now being used for mineral flotation processes. Some twenty different reagents were tested for sewage flotation, but only one, DP 243 (heterpolar laurylamine hydrochloride), proved efficient.

Among the conclusions reached on the basis of laboratory and pilot plant studies were: (1) Optimium dosage of DP243 for flotation of domestic sewage is usually in the range of 60 to 80 ppm.; (2) Retention time necessary for clarification appears to be about 15 min., (3) DP 243 did not remove much of the dissolved organic matter but suspended and colloidal matter is readily removed; (4) chem-

TENTATIVE DATA ON THE USE OF CRITICAL MATERIALS IN THE OPERATION AND MAINTENANCE OF SEWER SYSTEMS AND TREATMENT WORKS

(Based on 1940 operating records from 56 cities)

Item	Quantity per 1,000 pop. (Pounds)	Approximate national total (Pounds)
Sewer collection systems (1)		
Castings and pipe	473.0	37,800,000
Steel and iron	31.2	2,500,000
Rubber products	4.85	387,000
Sewage treatment works (2)		
Ferrous metals	115.0	5,700,000
Non-ferrous metals		
Brass, bronze, copper	2.95	158,000
Lead	.95	47,500
Aluminum	.73	36,500
Paints	.80	40,000
Chlorine	555.0	27,800,000
Fuel oil	97.7	4,900,000
Gasoline	13.5	670,000
Rubber	2.78	139,000

[1] Sewer system quantities based on 80,000,000 pop. served in 1942
[2] Sewage treatment " " " 50,000,000 " " " "

ical coagulants used in conjunction with DP 243 do not appreciably improve clarification; (5) strong bactericidal power is exhibited by DP 243; and (6) sludge is readily digested.

The consistent values of 97 to almost 100 percent removal of suspended solids and bacteria indicate that on the basis of these criteria for efficiency of sewage treatment, flotation is superior to the usual process. However, from the viewpoint of B.O.D. removal it is inferior to biological processes and yields results in the general range of those obtained by chemical precipitation, namely, 50 to 85 percent.

Cost of the flotation reagent at the present time is much too expensive to be economically used in sewage treatment.—*C. A. Hansen and Harold B. Gotaas, formerly research fellow and professor of sanitary engineering, respectively, University of North Carolina, Chapel Hill, N. C.*

Discussion—Of paramount importance to the sanitary engineer is the practicability of applying this method to the economical treatment of sewage. Dosages of 60 to 80 ppm. of reagent, as recommended, are common with several coagulants such as aluminum or iron salts. However, the cost of flotation agents, such as DP 243, is between 40 and 50 cents per pound, as compared with a range of 1 to 3 cents per pound for sewage coagulants. Results from the experiments conducted by the authors do not warrant expenditures of $200 to $300 per million gallons of sewage treated.—*Capt. Rolf Eliassen, U. S. Corps of Engineers, New York, N. Y.*

Acid waste disposal

Disposal of acid wastes from chemical manufacturing, particularly when the wastes produced change rapidly in volume and character, leads to serious problems. Such wastes—containing acids, alkalies and perhaps solvents and poisons—may affect sewers through corrosion, settling and digestion tank operation, biological growth responsible for self-purification in streams, or create odor nuisances and discoloration of painted surfaces.

At the Rahway Valley (N.J.) Joint Meeting treatment plant, which treats an average flow of 9½ mgd., 18 percent of the flow is waste discharged from 33 industries. The pH values of sewage received at the treatment plant varied from hour to hour over a range of 2.5 to 9.6. Eventually the entire digestion system was put out of commission leaving the tanks filled with an acidic, odiferous sludge that could not be dried.

Study revealed that one industry, contributing 1 to 1.25 mgd. of waste consisting of batches of mixed acids and spent alkalies, was the primary source of trouble.

A plant to pre-treat the wastes was built for the purpose of partial equalization and complete neutralization of the flow. Previously it was proven that little mixing of the wastes took place in a sewer over a distance of 3,000 ft.; the acid waste simply moved in slugs. The pre-treatment plant provides a one- hour detention period for an average flow of 1 mgd.; concentrated hydrated lime slurry (1,440 lb. of lime per million gallons) is added to assure effective neutralization of all acid.—*Willem Rudolfs, chief, division of water and sewage research, Agricultural Experiment Station, New Brunswick, N. J.*

Discussion—The investigation on the failure of travel in the branch sewer to "smooth out" the peak flows of concentrated wastes are extremely informative. One is often tempted to rely upon travel in the sewer for mixing and buffering; the negligible benefits accruing from such travel is revealed by these tests. Similar results were observed in a sewer system when it was found that the weekly discharge of three small vats at a plant some miles from the treatment works, although mixed with a flow of 19 mgd., was so pronounced that changes in pH at the plant made it possible to accurately estimate the time of dumping of the vats.—*Elson I. Killam, consulting engineer, New York, N. Y.*

Maintenance of sewers

Good sewer maintenance starts with good design. Particular emphasis should be placed on the construction of house connections. They are a more prolific source of trouble than any other part of the sewer system. Careful inspection is the exception rather than the rule and any kind of line and grade as well as poor joints are frequently accepted. The writer has succeeded in writing into the local plumbing code a required inspection and approval by the city engineer's office of the entire branch to the building wall in addition to the regular plumbing inspector's work. This is done primarily to get measurements to plot the entire branch and building front on sewer maps but also offers an opportunity to demand and get improved lateral construction. This complete information on laterals is not often found but is invaluable when trouble develops.

Emphasis on safety is important in sewer maintenance work. Badly rusted and weakened manhole steps have been responsible for so many accidents that some cities have abandoned them entirely and are using portable ladders. The presence of gas, either from sewage or other gases leaking into the sewers, is a constant menace in some communities. Smaller cities with good sewage velocities, delivering a fresh sewage to the outfall point, are not bothered with sewage gases but there is always the possibility of leakage from outside sources. A good life belt and a sufficient number of men on a job to quickly remove an injured man from a manhole is in an indispensable part of sewer maintenance equipment.

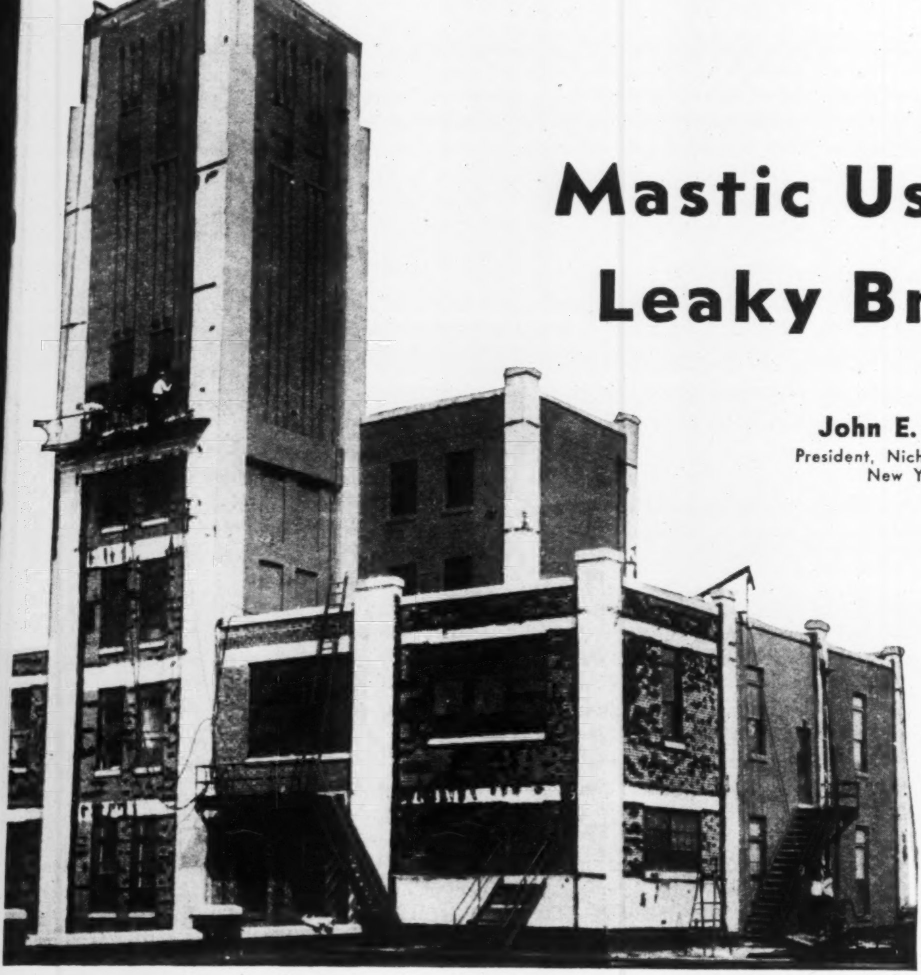
Ventilating blowers, gas testers and safety belts are not luxuries. It is difficult to convince men who have had no trouble in years of service that a real danger exists. A trip to the sewage treatment plant and an explanation at the gas engine operating on sewage gas will help to demonstrate the possibilities for trouble.

Causes of clogged sewers seem to be standard, with tree roots in undisputed first place and grease second. Such obstructions as sticks and bricks provide their share of trouble. Costs vary so widely that they seem to have little value for comparative purposes.

The most indispensable tool in the writer's equipment is a revolving brass fire-hose nozzle, a supply of 2½-in. hose and a good city water pressure. This is well known equipment but still dependable. Inserted in the low end of a clogged sewer where roots are not involved and the clogging material can be flushed out, this nozzle will pull the hose into the pipe as progress is made and provides sufficient water to give a good flushing velocity in the sewer where small pipes are involved.—*Roy L. Phillips, city engineer, Meadville, Pa.*

Mastic Used to Seal Leaky Brick Walls

John E. Nicholson
President, Nicholson & Galloway,
New York, N. Y.



Two "dampproofers" on a swinging scaffold apply gilsonite asphaltic mastic followed by slate granules. Repair of the wall to the right of the scaffold has been completed, the brickwork having been finished with rust colored granules and the concrete columns with buff granules. Lower walls have been pointed and cotton-cloth flashing applied where the brickwork joins the concrete frame.

Contents in Brief*—After several different methods were studied to stop water leakage through a large expanse of brick exterior wall of a warehouse, the owners chose to point up the joints, remove the spalling concrete, coat the walls with a gilsonite asphaltic mastic, and then cover the mastic with slate granules. The job is expected to take nine months and will require over 20,000 gal. of asphalt and 250 tons of granules.*

FOR MANY YEARS extensive water leakage has occurred through the exterior brick walls of the Pennsylvania Railroad's Harborside Terminal Warehouse, which is located on an exposed site on the Hudson River in Jersey City, N. J. Enclosing 27,000,000 cu.ft. of space it is one of the largest buildings in the nation. Because 600,000 sq.ft. or nearly thirteen acres of brick walls, including windows, were to be repaired, careful study was given to the best possible method to stop the leakage. Final decision was to point up the exterior of the walls, which are exposed to all directions of the compass, and add a coating of gilsonite asphaltic mix overlayed with slate granules.

Built in 1929, the reinforced-concrete frame building is E-shaped and mostly eight stories in height. Leakage started soon after the structure was completed and several different repair methods were considered. One method was repointing the joints and applying a colorless water-proofing, another was to carry out a thorough repointing job, and the third was the method now being followed.

The first scheme was tried on a few small areas but did not prove satisfactory. The cost of repointing was considered prohibitive because of the extensive labor involved in cutting out 90 percent of the mortar-joints. The method now being used was chosen because of the economy—a life of at least ten years being expected from the surfacing — and because the method meets the triple need of waterproofing, insulation and decoration.

Step-by-step procedure

A 20-man crew is employed on the repair job and the work can best be described step-by-step. First, eight "dampproofers" working on swinging scaffolds, supported from the top of the building, point up the open joints and caulk the joints around the windows with a gilsonite asphaltic, non-breathing black mastic of heavy calking consistency. The calking is applied with guns. This crew also applies asphalt-impregnated, cotton-cloth flashing where the brick walls join the projecting concrete frame, which extends outward about one foot beyond the walls. The flashing is so embedded in mastic as to extend three inches each way from the corner. The "dampproofers" also remove the spalling concrete and, after the exposed reinforcing steel has been scraped and painted, the areas are patched with mortar.

Next, a 6-man spray crew adds asphaltic mastic to the brick areas at the rate of 5 gal. per 100 sq.ft., which makes an impervious waterproof coating nearly $\frac{1}{8}$ in. thick. The mastic is about 50 percent gilsonite asphalt and 25 percent mica. It is applied by spray nozzle at 75 psi. pressure. The material is delivered at atmospheric temperature from a 15-gal. hopper, which weighs 750 lb. and is located on the ground. The air is supplied by a 320-cfm. compressor that operates all the pneumatic equipment.

In five or six minutes after the mastic has been applied this same crew adds 50 lb. of slate granules per 100 sq.ft. The granules, which are dyed red in color, and are made from Vermont slate crushed sufficiently fine to pass a No. 9 Tyler sieve but to be retained in a No. 30 sieve, are applied at 80-psi. pressure. Each nozzle used in applying the granules is fed from a 5-gal. hopper carried on the scaffold and the air is supplied to each nozzle at the rate of 100 cfm. The granules are thus securely embedded into the mastic.

Concrete areas covered

After about two weeks, or sufficient time to permit the coating on the brick areas to set up, a second crew of two men cover the concrete columns, copings and spandrel beams with the gilsonite asphalt mastic. To these areas are added buff granules of the same size as the red applied over the brickwork; the buff color is to distinguish the concrete areas from the brick construction. This operation completes the repair of the walls. The finished surface is considered highly resistant to fire, smoke, salt water, alkalies and acids.

The operators are assisted by a 4-man crew who move scaffolds and otherwise act as helpers. A superintendent and an assistant superintendent complete the complement of 20 men on the job.

Required Equipment

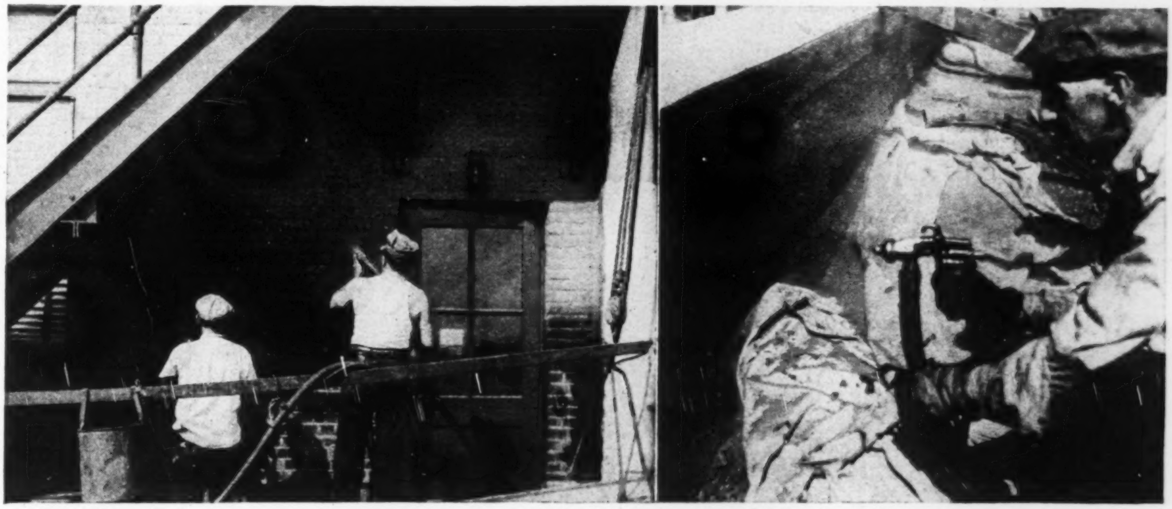
These men, working an average 7-hr. day, can repair and cover 8,000 sq.ft. of wall. Required equipment includes a 320-cfm. compressor, four 5-gal. hoppers for applying the mastic, eight 50-lb. capacity hoppers for adding the granules, fourteen swinging scaffolds 16 ft. long, and about 2,000 ft. of rubber hose. Filter masks are not required for the operators.

The granules are delivered by truck in 100-lb. bags and the asphalt mastic arrives in 55-gal. barrels. The mastic is not heated before use. In all, 250 tons of granules and over 20,000 gal. of mastic, it is estimated, will be required to complete the work. Operations are carried on only at temperatures above 32 deg. F. and no work is possible during rainy weather.

The repairs are being made by Nicholson & Galloway, roofing contractors of New York, for whom John E. Nicholson is in charge, and John Rathemacher is superintendent on the job. Nicholson & Galloway started the work early this year and it is expected to be complete within nine months from the time the work was started. Spraying machines for adding the mastic, and the hoppers for applying the granules are rented from Insul-Mastic Corp. of America, New York, which has patents on the process described. Two of the mastic machines and one of the spray machines for adding the granules cost $14,000.

Where brickwork joins concrete frame a cotton-cloth flashing is embedded in asphaltic mastic.

Two "dampproofers" at work. One at left is applying a 1/8-in. thickness of gilsonite mastic and at right workman adds slate granules at the rate of 1/2 lb. per sq. ft. The granule supply hopper is shown attached to scaffold guard rail at left. (Right) Close up of two workers—man nearest reader is applying the mastic.



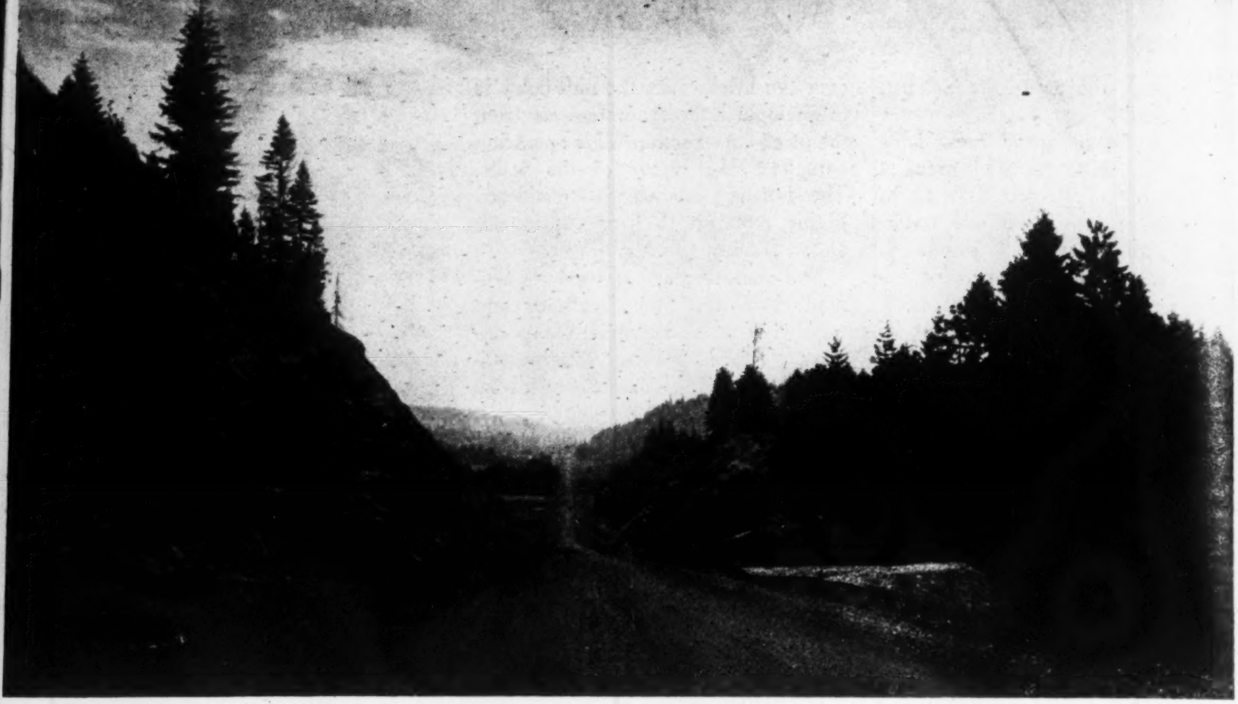


Fig. 1. Typical heavy rock construction on the Wolf Creek Highway.

Oregon Highways Open Rugged Country

FROM PORTLAND, ORE., to the shore of the Pacific the distance is only 60 mi., as the crow flies, but motor traffic has had to follow a tortuous 125-mi. route to reach Seaside via Astoria (the mouth of the Columbia River) or 107 mi. via McMinnville to Tillamook, 40 mi. down the coast. Between these two points the coast has been a relatively inaccessible region until the Wolf Creek and the Wilson River Highway projects penetrated the rough, mountainous terrain that had discouraged earlier road projects. These two new routes are as yet only 65 percent completed but in the 9 yr. during which construction has been under way, the more difficult portions through the rough mountain regions have been finished and opened to traffic. Thus, by connections to older roads, major benefits of the new highways are being utilized even before final completion. From Portland to Tillamook over the final route, the distance will be only 64 mi., a saving of 43 mi. on the best previous route.

In addition to wartime advantages and benefits to vacationists, these new roads provide access to some 12,000,000 b.ft. of timber. Logging trucks began to use portions of these roads as soon as they were opened and already some 5,000,000 b.ft. of timber has been brought out of previously inaccessible stands.

The desirability of direct access to the sea has long been appreciated. Even before the advent of the automobile, adventurous promoters built a toll road over much the same location followed by the present Wilson River route. However, the toll road was narrow, tortuous and steep and its clay surface made it impassable in wet weather. It was the only continuous road previously existing anywhere near the new routes and it was a help

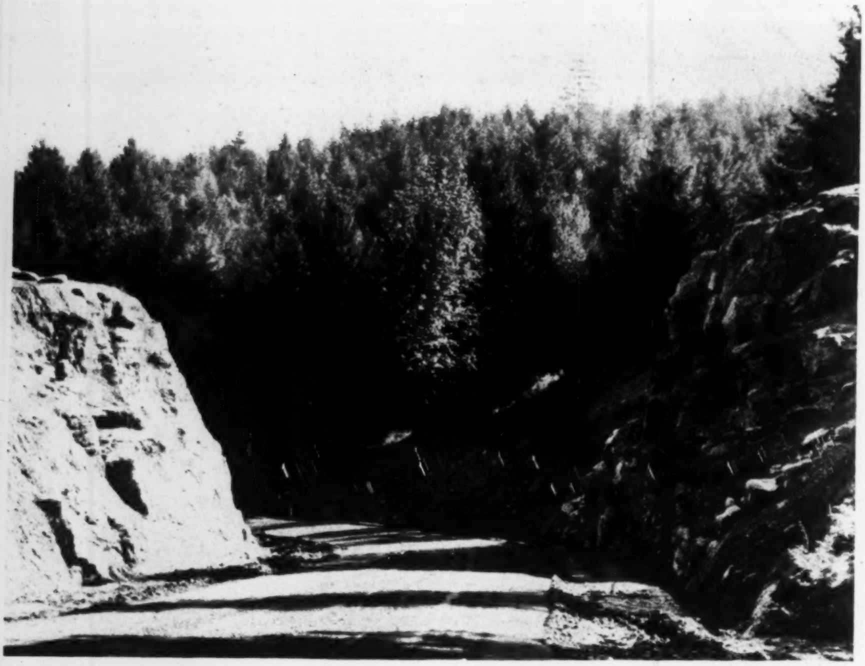


Fig. 2. Heavy rock cut in the hills west of Portland, looking east from the summit.

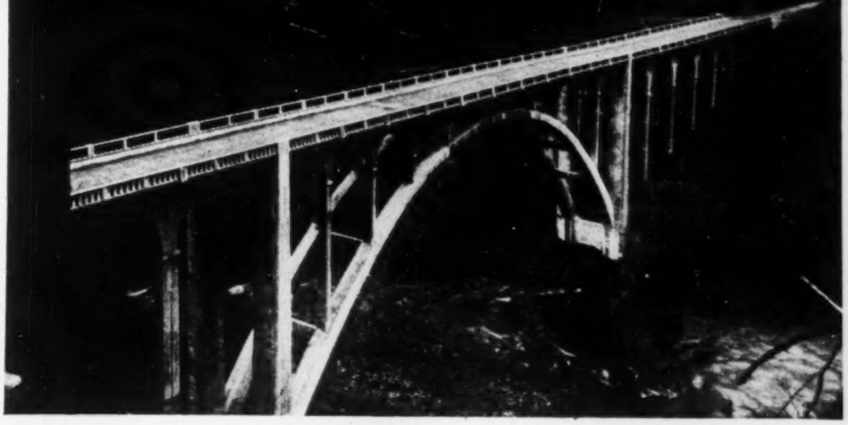


Fig. 3. The Nehalem River Bridge on the Wolf Creek Highway is in typical heavily timbered territory.

in work on the new projects where even right-of-way clearing involved major operations (trees 5 or 6 ft. in diameter were common). The remote location with the incidental problems of delivering supplies and workmen made it necessary to establish camps in the woods with complete community facilities.

Maximum grade on the new highways is 6 percent. Curvature on the Wolf Creek Road does not exceed 6 deg.; on the Wilson River route 10 deg. was adopted as maximum. The coast range is crossed at El. 1,684. Original plans for the Wilson River Highway called for construction of three tunnels; later it was decided to open-cut two of them. One of these involved 200,000 cu.yd. and the other 350,000 cu.yd. of excavation. An average excavation total for both routes of 116,000 cu.yd. per mile indicates the amount of heavy grading necessary.

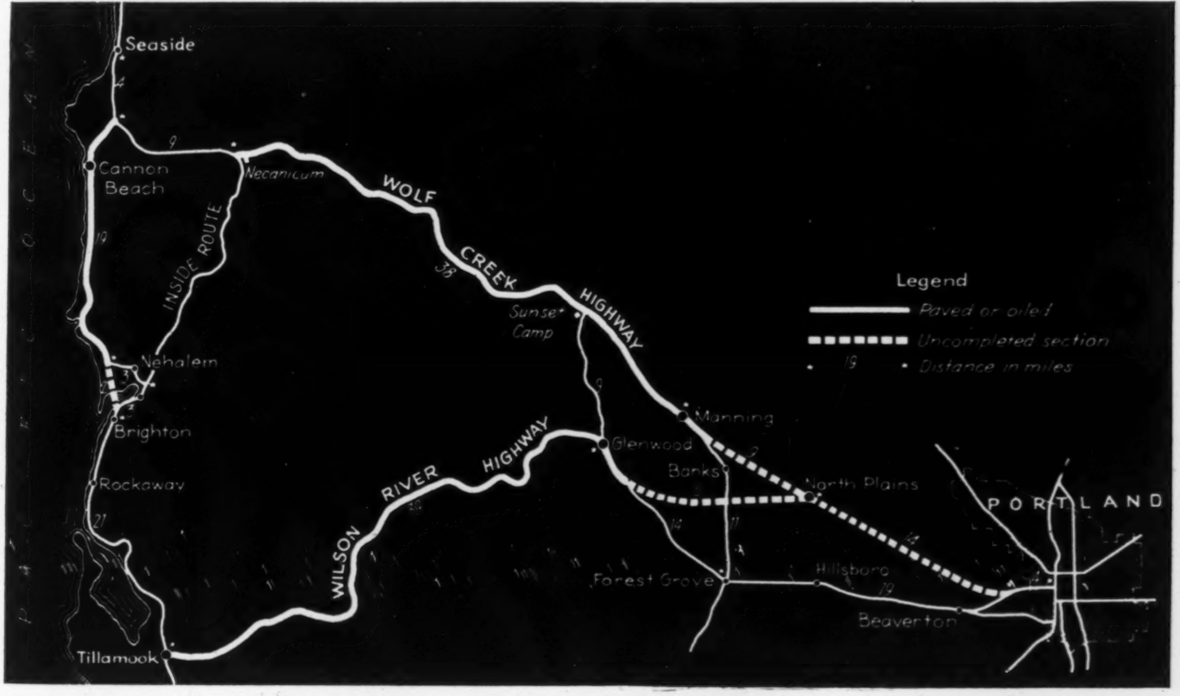
In addition to excavated rock used to provide the base course for the road bed, 335,400 cu.yd. of pit run or quarry run rock was also required. Twelve quarries were opened, including one in a highway cut, to furnish the 695,000 cu.yd. of crushed rock for surfacing.

On these roads deep rock bases are used in accordance with highway standards, which are fitted to needs of the extremely cold, wet climatic conditions of the Oregon mountain regions. The entire Wolf Creek Highway has an 18-in. course of rock topping and surfacing.

Recognizing the seriousness of the slide-prevention problem, special attention was given to (1) drainage by open ditches and (2) tunneling to tap the subterranean water flow along slip seams. Some ditches as deep as 35 ft. were dug and, after perforated pipe was laid, were then backfilled with coarse rock and cord wood. During the progress of the work many landslides occurred, some involving 20,000 or 30,000 cu.yd.

WPA crews on the two routes for the past 6 years have averaged 1,230 men and have afforded 88,000 man months of employment. Up to April 1, 1942, expenditures on the two projects had totaled about $14,000,000, of which about $3,300,000 was expended under private contracts for tunnel work, part of the grading and all the bridges (except some log bridges). Expenditures by WPA totaled about $8,000,000; the remainder of the cost was made up by federal aid and contributions from city, county and state funds. The project as a whole is under the engineering direction of the Oregon Highway Department, which has acquired several hundred acres along each side of both highways for development as roadside park areas when men and money are available.

Fig. 4. Map of new routes between Portland and the Pacific. (Completion status as of April, 1942.)


Seaside
Cannon Beach
Necanicum
WOLF CREEK HIGHWAY
INSIDE ROUTE
Sunset Camp
Nehalem
Brighton
Rockaway
Tillamook
WILSON RIVER HIGHWAY
Glenwood
Manning
Banks
North Plains
Forest Grove
Hillsboro
Beaverton
PORTLAND
OCEAN
4
9
19
38
3
2
21
30
9
9
14
11
14
19
Legend
Paved or oiled
Uncompleted section
19 Distance in miles

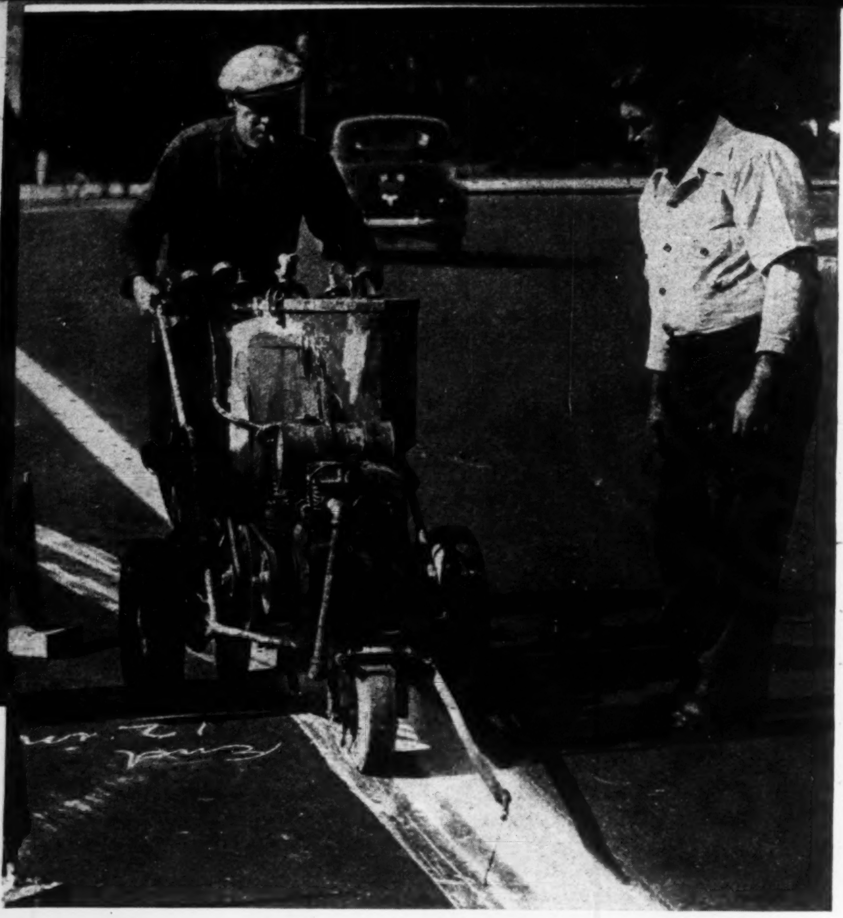


Fig. 1. Power-driven spraying machine equipped with special containers for distributing glass beads in the paint line is used on Philadelphia streets to provide blackout traffic control lines that reflect light.

Glass-Beaded Paint For Blackout Traffic Control

Robert A. Mitchell

Traffic Engineer, Department of Public Safety,
Philadelphia, Pa.

Contents in Brief—*White paint surfaced with glass beads has been found superior to all other types of painted pavement marking in Philadelphia, where 500 miles of such markings are now being laid for blackout traffic control. Although glass beaded paint costs more than twice as much as ordinary traffic paints, experience shows that it wears four to five times as long. On vertical surfaces, glass beaded cloth is used instead of the paint.*

TESTS MADE by Philadelphia on blackout painting for traffic control reveal that white or yellow pavement markings are of little value, and that only white paint containing glass beads gives sufficient indication under low intensity light conditions. As a result of experiments begun early in the year some 500 miles of this type marking is being placed on streets. On vertical surfaces, such as curbs, poles and posts, the glass-beaded paint has not given the best results, however, and glass-beaded cloth will be used.

Philadelphia's experience confirms the fundamental fact that blackout painting for traffic control must be based on the direction and intensity of the light output from motor vehicles. It is impossible from an economical standpoint, for example, to obtain any type of paint or material that will show of its own accord during darkness. Experiments were made with a luminous paint where samples glowed during six hours of darkness, but it is far too expensive to be used for traffic control purposes.

Pavement markings found best

The direction and intensity of the light from the blackout driving lamp approved by the U. S. Army are such that no object over 30 in. above the roadway will be seen by the driver, and even such objects are not visible unless they are close to the edge of the highway and from 50 to 60 ft. in front of the vehicle. Self-illuminated signs properly shielded are visible for about 110 ft. Pavement markings, on the other hand, are more directly in the line of light and therefore are far superior in guiding vehicle drivers under blackout conditions.

The type of pavement marking to be employed must be selected with great care because of the low intensity of the beam from the headlamps. Experiments made with masked headlamps giving about the same light output as the army lamp show conclusively that plain white or yellow traffic paint is of little value. Only that paint containing properly formed glass beads give sufficient indication. This conclusion reached in Philadelphia was the same result obtained from experiments made in Ohio by the Joint Committee on Uniform Traffic Control Devices, of which the author is a member.

Spray machine adds beads

Philadelphia made its first experiment in February 1942 when a street twelve blocks long was equipped with all types of markings and signs. Results with glass-beaded, white traffic paint were so thoroughly satisfactory that an order was placed for 7,500 gallons together with two special spraying machines to apply it. It was estimated that this quantity of paint was sufficient to adequately place broken center lines, cross walks and curb markings on 500 miles of streets.

The power-driven spraying machines are equipped with special containers for properly distributing the glass beads in the paint line. In an average day of eight hours the machines can put down eight miles of 6-in. wide centerline composed of alternate 25-ft. stripes and 25-ft. spaces. Cross walk and curb markings naturally cannot be applied as rapidly. The above time includes going from shop to field location and back again, and also includes the time required for cleaning of the machine after each day's work. Daily cleaning of the machines is most important because any dried paint blocking the spraying apparatus causes an uneven surface and prevents the satisfactory distribution of the glass beads.

Cheaper in the long run

Glass-beaded paint costs about two and one-half times as much as ordinary traffic paint. If properly applied, however, it will remain perfectly visible on the highway from four to five times as long. Thus in the final analysis it is really cheaper not only from the standpoint of the purchase price, but also in reducing maintenance costs. The paint installed on the experimental course in February is still effective; center lines put on Broad Street during the first week of June show practically no wear today.

The best results are obtained on smooth pavement materials. On granits block pavement the results have not been so good, but the paint manufacturers are working closely with the city to find some way to get the paint to adhere better to the blocks.

Glass-beaded cloth for poles

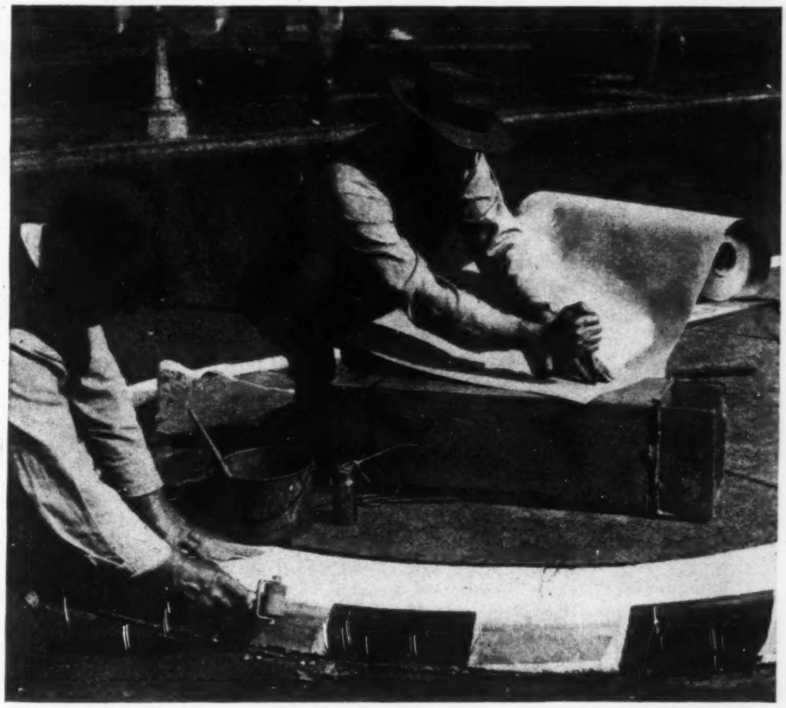
While glass-beaded paint is superior to anything tried for pavement markings, it does not give the best results when used on vertical surfaces such as curbs, poles and posts. In the first place, it is difficult to apply the glass beads to a vertical surface, and second, the beads do not seem to reflect the light as well as they do in a horizontal surface. Experiments have shown that a glass-beaded cloth gives the best results on vertical surfaces; not only can it be applied easily and quickly, but it is not injurious to trees.

A number of rolls of this material have been ordered. It will be used in 4-in. wide strips to mark curbs, poles, posts, trees, and any other obstruction in the road or object alongside the street that would serve to guide motorists and keep them from driving off the road under blackout conditions. Strips on the posts, trees, etc., are installed to a height of 2.5 ft. above the roadway, and only on the side from which traffic approaches. This gives an effective coverage with a minimum amount of material.

Glass-beaded cloth can be obtained in red, yellow, silver, or white colors, each of which has good reflecting qualities. It is simple to apply, it is waterproof and should last for a considerable length of time.

Practically all of the main highways in Philadelphia have been marked with center lines and cross walks and those who have driven through the streets during a practice blackout report that these markings have been of considerable aid in moving about.

Fig. 2. On vertical surfaces, such as curbs and poles, strips of glass-beaded cloth are more effective than glass-beaded paint. Easy to apply, and waterproof as well, the beaded cloth has good reflecting qualities.



Solvents Used to Remove Moisture from Timbers

A plant for testing commercial possibilities of a process for extracting oil, resin and moisture from timber by means of solvents, is being built by the Western Pine Association in Portland, Ore. The method is a byproduct of experiments on removal of oil and resin from knots to prevent "bleeding" through paint. During these experiments it was discovered that the solvents reduced moisture content to a surprising degree. Then tests with $2\frac{1}{2}$ x 4 x 18-in. pieces of green Ponderosa pine showed that the solvents could reduce moisture to about 10 percent leaving the wood much lighter in color than when dried in a kiln. Moreover, specimens treated by solvents did not check and knots lost their oily appearance.

The new process produces an oily, resinous extract amounting to 2 to 5 percent of the original weight of the timber treated. This extract is now undergoing analysis in search of values it may have as a byproduct useful in the manufacture of paints, plastics, etc.

A notable characteristic of wood treated by the extraction method is said to be its readiness to absorb liquids such as preservatives, water repellants, fire retardants, and coloring matter or stains. Studies are now being made on the feasibility of a single treatment in which lumber would be dried, protected against decay organisms, given fire-resistant qualities and a color treatment.

Amounts of Steel Required For Steel Mill Buildings

***Contents in Brief**—This is a report of a study made by the Specifications Branch, Conservation Division, War Production Board to determine those types of roof construction whose use involves the least amounts of steel in the overall design of steel mill buildings. Fourteen types of roof were studied in connection with three different spans of roof trusses. Some studies of timber mill buildings are also included. Except for some graphs of the results given in Table B, the entire report is reproduced herewith.*

DUE TO THE CURRENT national emergency, the conservation of steel in the design of engineering structures is of considerably more importance at present than it has been in the past. The study reported herein was conducted primarily to develop information for those staff members of the War Production Board who are engaged in the review of defense plant mill buildings and other construction projects in order to reduce the use of critical materials therein to a minimum.

No information contained in this report is to be construed as contradicting, amending or superseding the Army and Navy Munitions Board "List of Prohibited Items for Construction Work" or any other list of critical or prohibited materials. Neither is it to be regarded as amending or superseding any "L" or "M" Orders. The data must be regarded as advisory or informational in character only, but as such they should be a valuable guide to those engaged in architectural and engineering design.

Most of the work connected with this study was performed by James A. Schad, Civil Engineering Section, Specifications Branch, Conservation Division, who deserves special credit for his painstaking efforts. During the early stages of the study valuable assistance was rendered by Robert K. Duke. The project was initiated by and carried out under the immediate direction of C. A. Willson, Chief, Civil Engineering Section. Credit is due to H. L. Whittemore, Chief, Engineering Mechanics Section, National Bureau of Standards for valuable suggestions and advice regarding the preparation and arrangement of this report. C. L. Warwick is Chief of the Specifications Branch and the report as issued is signed by him.

Purpose and scope

The primary purpose of the study was to determine those types of roof construction for steel mill buildings, which, for a variety of conditions, require the least amounts of steel in the overall design from roof to footings. The study should be of assistance to designing engineers in selecting that type of roof which is adequate and, yet, involves the least amount of steel in the entire building.

The types of roof construction studied are tabulated below; all supported by steel trusses and columns:

Not only were various types of roof construction studied, but the total amount of steel required for a typical bay in a steel mill building—both with and without a crane—including the steel in the trusses, bracing between trusses, crane girders, columns and footings, was determined. Further, the amount of steel required for the side walls and end walls was estimated.

Although, primarily, the study was one of steel mill buildings, it also dealt with the use of wood. (See Table D).

Purlin and Truss Spacings—In order to cover as wide a range as possible, purlin spacings of 5 ft. 6 in., 6 ft. 6 in., 7 ft. 6 in., and 8 ft. 6 in. were studied. The spans and spacings of trusses are as given in Fig. 1, which illustrates the trusses and columns designed and for which weights of steel were computed. The ratio of height of truss (distance between gravity axes of top and bottom chords) to span ranges from about 1/10 to 1/14. The range of the study is such that a designer can determine the conditions as to purlin spacing, truss spacing, etc., which require the least amount of steel.

The distance from the top of the column footing to bottom of the truss is 27 ft. in all cases. For buildings with a crane, the distance from the top of the footing to the crane rail bracket on the column is 18 ft.

Working Stresses—The structural steel design was based on the American Institute of Steel Construction Specification for the Design, Fabrication and Erection of Structural Steel for Buildings as adopted in 1936 (basic working stress 20,000 psi.). The study was made prior to the issuance of War Production Board National Emergency Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings (Directive No. 8), dated September 10, 1942, which makes mandatory the use of a basic working stress in flexure of 24,000 psi. The amounts of

Type No. Solid-Web Purlins	Type No. Open-Web Purlins	Types of Roof Construction
12	10	Precast reinforced light-weight concrete tile.
14	11	Poured reinforced gypsum suspension system.
18	15	Reinforced gypsum poured on permanent board form.*
19	16	Reinforced gypsum (metal edge) plank.
20	17	Precast reinforced gypsum tile (short span).*
22	21	Steel deck.
23	24	Reinforced light-weight concrete poured on steel deck.

---

* Steel sub-purlins used in Types 15, 17, 18 and 20. The other types do not require sub-purlins.

steel as indicated herein would be decreased by approximately 10 to 15 percent by compliance with that Directive. As an example, referring to Table B, the total amount of steel required in a typical bay of a building (no crane in such building) in which the spacing of the trusses is 20 ft., and the span thereof 100 ft. 6 in. is 12.67 lb. per sq. ft. of floor area when Type 20 roof construction is used at a purlin spacing of 5 ft. 6 in. The corresponding figure based on a design in compliance with War Production Board Directive No. 8 would be 11.15 lb. per sq. ft., thus effecting a saving of 12.0 percent.

Steel Roof Deck—For steel roof deck (Types 13, 21, 22, 23, 24 and 25) the working stress is 18,000 psi., the deck being designed as a simple beam between purlins (*Wl*/8). If the steel deck is continuous over three or more spans, the moment coefficient should be *Wl*/10, thereby decreasing the amount of steel. A higher working stress would effect a further decrease in the amount of steel in the deck.

Solid-Web Purlins—If the purlins are solid-web structural shapes, the working stress is 20,000 psi. They are designed as simple beams (*Wl*/8), the governing factor being flexural stress *only*. For each type, the purlin selected is the lightest which is adequate for the load. It should be noted that although, usually, purlins are standard channel sections, such sections are not the lightest that can be used. Other solid-web rolled sections, such as light beams and joists, involve lesser amounts of steel and were selected in most cases in the study. Deflection of solid-web purlins was disregarded purposely. If some limit were placed on deflection of such purlins (such as limiting the minimum depth of the purlin to 1/40 of the span), the weights of solid-web purlins as reflected in the attached data would be increased.

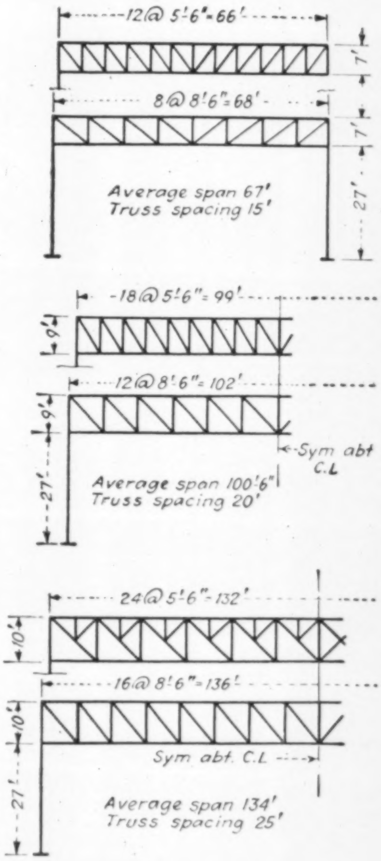


Fig. 1. Three different truss spans and truss spacings that were used in the steel-requirements study.

Open-Web Purlins—If the purlins are open-web members, the working stress is 18,000 psi. They were designed as simple beams (*Wl*/8).

The weights of open-web steel purlins are based on an average of weights of the products of the various manufacturers. In the case of the use of the products of some manufacturers, the weight of steel in the purlins would be less than that which is reflected in the figures given in the attached data.

Sub-Purlins—In all types involving the use of sub-purlins, the working stress thereof is 20,000 psi. They were designed as beams partially restrained at their supports (*Wl*/10).

Loads—In order to make the data comparable, the design of each type of roof deck was based on a total superimposed load of 37.5 lb. per sq. ft. (Live load of 30 lb. per sq. ft. plus 7.5 lb. per sq. ft. for roof covering, etc.). To this total of 37.5 lb. per sq. ft. the respective dead load for each type of roof deck was added to determine the total design load. A horizontal wind load of 20 lb. per sq. ft. of wall was assumed.

Flat and Pitched Roofs—The study was based on buildings with flat roofs. However, the data given should be of value in estimating the amounts of steel required in buildings with pitched roofs of the several types of construction studied. In some cases, the amount of steel required for

TABLE A—TOTAL AMOUNTS OF STEEL REQUIRED IN TYPICAL BAY OF STEEL MILL BUILDING

(Including steel required for crane girder)

Lb. per Sq. Ft. Floor Area

Purlin Spacing	Roof Type														Max. Range in % of Least Amount of Steel Required
	(10)†	*(11)*	**(12)**	*(15)*	**(14)**	*(16)*	*(21)*	*(24)*	**(18)**	**(22)**	**(19)**	**(23)**	*(17)*	**(20)**	
	15′–0″ Spacing of Trusses (Average Span of Truss 67′–0″)														
5′–6″	13.39	13.69	13.64	14.24	13.81	14.44	14.08	14.21	14.36	14.36	14.56	14.49	14.97	15.25	14
6′–6″	13.33	13.62	13.56	14.05	13.86	14.21	14.37	14.50	14.29	14.60	14.45	14.73	14.88	15.09	13
7′–6″	13.31	13.74	13.48	14.00	13.92	*	14.69	14.82	14.18	14.90	*	15.03	15.73	15.99	20
8′–6″	13.34	13.67	13.57	14.26	13.90	*	14.65	14.78	14.49	14.71	*	14.84	16.16	16.37	23
	20′–0″ Spacing of Trusses (Average Span of Truss 100′–6″)														
5′–6″	13.99	14.20	14.35	14.74	14.56	14.94	14.27	14.40	15.09	14.71	15.30	14.84	15.60	16.12	15
6′–6″	13.79	14.13	14.25	14.53	14.59	14.70	14.79	14.92	14.97	15.11	15.15	15.24	15.36	15.81	15
7′–6″	13.66	14.13	14.06	14.34	14.53	*	14.87	15.00	14.72	15.21	*	15.34	16.36	16.89	24
8′–6″	13.83	14.20	14.32	14.75	14.69	*	14.82	14.95	15.21	15.17	*	15.30	16.71	17.09	24

* Not adaptable for these purlin spacings.

† Roof types in italics use open web purlins; those in heavy roman use solid web purlins.

NOTES: Indicated amounts consist of steel in roof deck, sub-purlins, purlins, trusses, 1.25 lb. per sq. ft. for bracing between trusses in the planes of the top and bottom chords thereof, crane girders (capacity of crane 20 tons — 3 or 5 ton auxiliary. Steel in runway rail not included), columns and footings.

Inasmuch as a crane with a span greater than 100′–6″, ordinarily, would not be used, this table does not include the case of a 25′–0″ spacing of trusses on an average span of 134′–0″.

TABLE B—TOTAL AMOUNTS OF STEEL REQUIRED IN TYPICAL BAY OF STEEL MILL BUILDING

(No cranes in the building)

Lb. per Sq. Ft. Floor Area

Purlin Spacing	Roof Type *(10)*†	*(11)*	**(12)**	*(15)*	**(14)**	*(21)*	*(16)*	*(24)*	**(18)**	**(22)**	**(23)**	**(19)**	*(17)*	**(20)**	Max. Range in % of Least Amount of Steel Required
	15′-0″ Spacing of Trusses (Average Span of Truss 67′-0″)														
5′-6″	9.61	9.84	9.86	10.41	9.96	10.55	10.59	10.68	10.53	10.83	10.96	10.71	10.89	11.17	16
6′-6″	9.55	9.77	9.78	10.22	10.01	10.84	10.36	10.97	10.46	11.07	11.20	10.60	10.80	11.01	17
7′-6″	9.53	9.89	9.70	10.17	10.07	11.16	*	11.29	10.35	11.37	11.50	*	11.65	11.91	25
8′-6″	9.49	9.75	9.72	10.43	9.98	11.12	*	11.25	10.66	11.18	11.31	*	12.08	12.29	30
	20′-0″ Spacing of Trusses (Average Span of Truss 100′-6″)														
5′-6″	10.46	10.68	10.82	11.22	11.04	10.65	11.42	10.78	11.57	11.09	11.22	11.78	12.15	12.67	21
6′-6″	10.26	10.61	10.72	11.01	11.07	11.17	11.18	11.30	11.45	11.49	11.62	11.63	11.91	12.36	20
7′-6″	10.13	10.61	10.53	10.82	11.01	11.25	*	11.38	11.20	11.59	11.72	*	12.91	13.44	33
8′-6″	10.31	10.70	10.80	11.23	11.19	11.20	*	11.33	11.69	11.55	11.68	*	13.26	13.64	32
	25′-0″ Spacing of Trusses (Average Span of Truss 134′-0″)														
5′-6″	11.79	12.02	12.54	12.55	12.78	12.02	12.76	12.15	13.32	12.57	12.70	13.51	13.67	14.73	25
6′-6″	11.73	12.08	12.63	12.47	12.99	12.49	12.62	12.62	13.37	13.12	13.25	13.52	13.72	14.66	25
7′-6″	11.60	12.10	12.73	12.59	13.22	12.79	*	12.92	13.39	13.27	13.40	*	14.55	15.35	32
8′-6″	11.94	12.35	12.68	12.89	13.08	12.69	*	12.82	13.58	13.39	13.52	*	14.99	15.89	33

* Not adaptable for these purlin spacings.

† Roof types in italics use open web purlins; those in heavy roman use solid web purlins.

NOTES: Indicated amounts consist of steel in roof deck, sub-purlins, purlins, trusses, 1.25 lb. per sq. ft. for bracing between trusses in the planes of the top and bottom chords thereof, columns and footings.

pitched roofs would be greater than that shown herein, due to increased wind loads and also because of the necessity for heavier sections for the ridge and eave purlins. In other cases, the steel required for pitched roofs may be less than that indicated herein, particularly if the depths of the trusses for pitched roofs are relatively great. However, for any given condition, the relation between the several types of roof decks, from the standpoint of conservation of steel, would remain approximately the same as indicated.

Results

The results are given in tabular form in Tables A to C inclusive. The various types of roof construction are arranged in sequence therein, in ascending order, according to the amount of steel required in the case of a 20 ft. spacing of trusses and a purlin spacing of 6 ft. 6 in. These conditions of truss and purlin spacing have been selected as being more or less typical. It will be noted that for other spacings of trusses and purlins, the sequence is only slightly different. For convenience in making comparisons, the weights of steel are expressed in pounds per square foot of horizontal floor (or roof) area.

A typical bay is defined as consisting of the roof deck, sub-purlins, purlins, trusses, bracing between trusses in the planes of the top and bottom chords thereof, crane girders (runway rail itself is not included), columns and footings. It does not include the side wall or end wall framing.

Bracing is rather a variable quantity. However, the steel involved in the bracing between the trusses may be estimated at about 1.25 lb. per sq. ft. of horizontal area. The figures indicated in Tables A, B and C include this amount for such bracing.

The total amounts of steel required in a typical bay of a building in which a 20 ton crane is used are indicated in Table A. The amounts shown are the totals for a typical bay as defined previously and are predicated on the use of steel trusses and steel columns.

The total amounts of steel required in a typical bay of a building in which there is no crane are indicated in Table B. The amounts shown cover the same items as those indicated in Table A.

The amounts of steel required in the roof deck, sub-purlins, purlins, trusses and bracing between trusses in the planes of the top and bottom chords thereof, *only*, are indicated in Table C.

For any given span of truss (spacings thereof as indicated in the study) there is a certain purlin spacing which, if used, would require the least amount of steel in a typical bay. The graphs in Fig. 2 are based on such specific purlin spacing in each case and apply to a building in which there is no crane.

Discussion and conclusions

Steel Required in Typical Bay—For the conditions studied, in the case of steel columns and steel trusses in a building with a 20-ton crane (the crane carried on the main building columns), the total amount of steel required in a typical bay (Table A), depending upon the type of roof construction used, ranges from about 13.25 to 17.00 lb. per sq. ft. of floor area. The least amount of steel is involved when Type 10 roof construction is used, the greatest amount when Type 20 is employed. The maximum range in the use of steel, depending upon the type of roof, and expressed as a percentage of the amount of steel used in the case of the roof construction in which the least amount of steel is involved, is about 13 to 15 percent in the case of purlin spacings of 5 ft. 6 in. and 6 ft. 6 in. and about 20 to 24 percent for purlin spacings of 7 ft. 6 in. and 8 ft. 6 in.

The crane was assumed to be carried by a bracket on the main building column. In some buildings the crane is carried on a separate column, which is connected to the main column by means of diaphragms at several points. Although a greater amount of fabrication is involved in using separate columns, there may be

TABLE C—AMOUNTS OF STEEL REQUIRED EXCLUSIVE OF COLUMNS AND FOOTINGS, IN TYPICAL BAY OF BUILDING

Lb. per Sq. Ft. Floor Area

Purlin Spacing	Roof Type														*Max. Range in % of Least* Amount of Steel Required
	(10)†	*(11)*	**(12)**	*(15)*	**(14)**	*(16)*	*(21)*	**(18)**	*(24)*	**(19)**	*(17)*	**(22)**	**(23)**	**(20)**	
	15'-0" Spacing of Trusses (Average Span of Truss 67'-0")														
5'-6"	6.01	6.24	6.26	6.81	6.36	6.99	6.95	6.93	7.08	7.11	7.29	7.23	7.36	7.57	26
6'-6"	5.95	6.17	6.18	6.62	6.41	6.76	7.24	6.86	7.37	7.00	7.20	7.47	7.60	7.41	28
7'-6"	5.93	6.29	6.10	6.57	6.47	*	7.56	6.75	7.69	*	8.05	7.77	7.90	8.31	40
8'-6"	5.89	6.15	6.12	6.83	6.38	*	7.52	7.06	7.65	*	8.48	7.58	7.71	8.69	48
	20'-0" Spacing of Trusses (Average Span of Truss 100'-6")														
5'-6"	7.88	8.05	8.24	8.60	8.41	8.79	8.29	8.95	8.42	9.15	8.33	8.73	8.86	9.85	25
6'-6"	7.68	7.98	8.14	8.39	8.44	8.55	8.81	8.83	8.94	9.00	9.09	9.13	9.26	9.54	24
7'-6"	7.55	7.98	7.95	8.20	8.38	*	8.89	8.58	9.02	*	10.09	9.23	9.36	10.62	41
8'-6"	7.68	8.01	8.17	8.61	8.50	*	8.84	9.07	8.97	*	10.44	9.19	9.32	10.82	41
	25'-0" Spacing of Trusses (Average Span of Truss 134'-0")														
5'-6"	9.80	10.02	10.55	10.55	10.78	10.76	10.11	11.32	10.24	11.51	11.60	10.66	10.79	12.66	29
6'-6"	9.74	10.08	10.64	10.47	10.99	10.62	10.58	11.37	10.71	11.52	11.65	11.21	11.34	12.59	29
7'-6"	9.61	10.10	10.74	10.59	11.22	*	10.88	11.39	11.01	*	12.48	11.36	11.49	13.28	38
8'-6"	9.94	10.33	10.68	10.89	11.06	*	10.78	11.58	10.91	*	12.92	11.48	11.61	13.82	39

* Not adaptable for these purlin spacings.

† Roof types in italics use open web purlins; those in heavy roman use solid web purlins.

NOTE: Amounts shown are steel required in roof deck, sub-purlins, purlins, steel trusses and 1.25 lb. per sq. ft. for bracing between trusses in the planes of the top and bottom chords thereof, *Only*.

some saving in material, in some cases, as compared with using a single column.

If there is no crane, the total amount of steel required in a typical bay (Table B) ranges from 9.50 to 13.75 lb. per sq. ft. (These figures apply to the 15 and 20 ft. spacing of trusses). Thus a comparison can be made with the foregoing case in which a 20-ton crane is used, the corresponding figures pertaining thereto ranging from 13.25 to 17.00 lb. per sq. ft. This indicates that the presence of a 20-ton crane increases the total required amount of steel by an amount ranging from 24 to 40 percent as compared with a building in which there is no crane.

In a building without a crane, in which the spacing of the trusses is 25 ft. and the span thereof 134 ft. (Table B), the total amount of steel required in a typical bay ranges from about 11.50 to 16.00 lb. per sq. ft.

In a building without a crane, the maximum range in the use of steel, depending upon the type of roof used, is indicated in Table B. It will be noted that this range is greater than the corresponding one in the case of a building with a crane. This is as would be expected.

A study was made to determine the extent of the increase in the amount of steel required in the case of cranes of capacities greater than 20 tons. As an example, let it be assumed that a 40-ton crane (with 10- or 15-ton auxiliary) is used in a building in which the trusses are spaced 15 ft. apart, the span thereof is 67 ft. and the roof construction is Type 20 at a purlin spacing of 5 ft. 6 in. Referring to Table A, in the case of a 20-ton crane, the total amount of steel required is 15.25 lb. per sq. ft. If a 40-ton crane were used instead of the 20-ton crane, the corresponding total amount of steel required would be 17.37 lb. per sq. ft., an increase of approximately 14 percent.

It should be noted that for buildings of greater heights than that indicated herein, the amount of steel required in a typical bay would be increased, particularly due to the resulting greater wind load.

In a building without a crane, the amount of steel in the truss itself

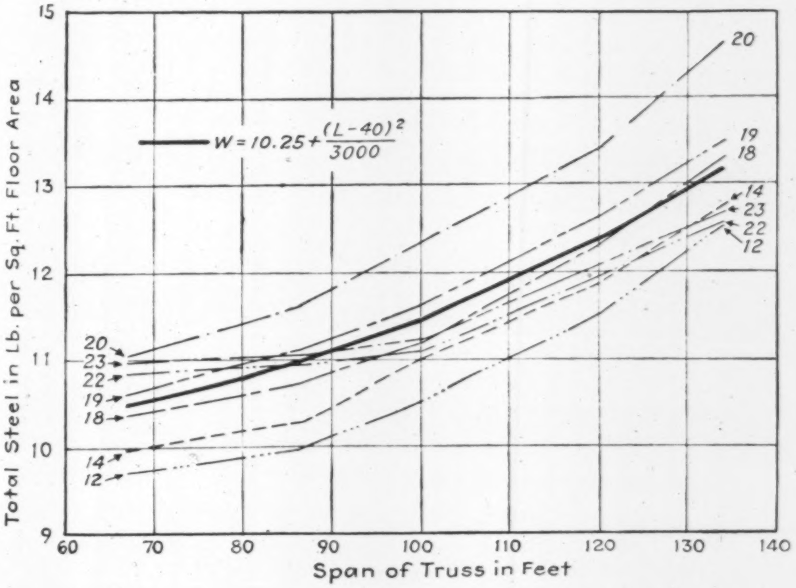


Fig. 2. Total amounts of steel required in a typical bay of a craneless building using solid-web purlins in the roof. The purlins spacing used in each case is that which results in least total amount of steel.

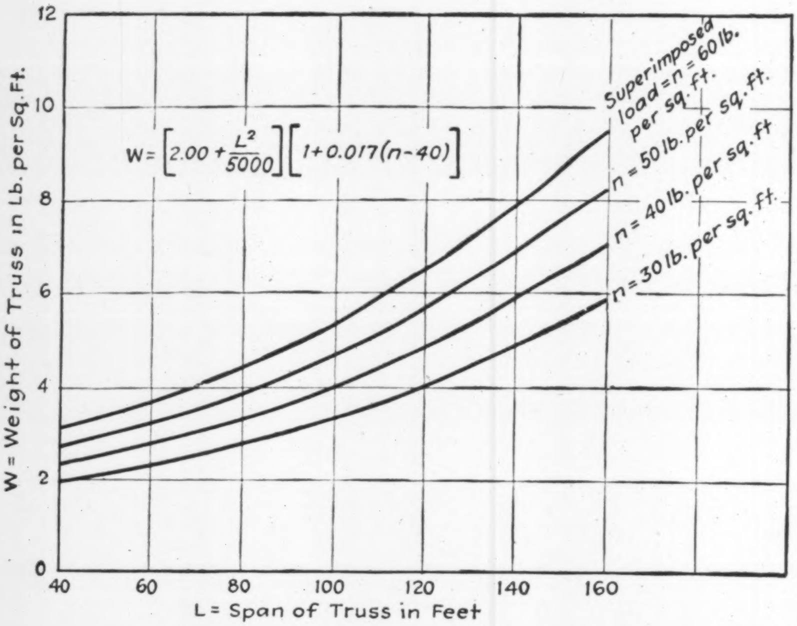


Fig. 3. Graphs showing roof truss weights calculated from the formula shown, which was developed from the results of the study.

ranges from about 25 to 48 percent of the total amount of steel required in a typical bay.

In all cases, for any given type of roof construction, the amount of steel required when open-web steel purlins are used is less than that involved for solid-web purlins. The decrease in the amount of steel in the purlins ranges from about 16 to 34 percent when open-web members are used. In a building without a crane, the total amount of steel required in a typical bay is decreased in amounts ranging from about 2 to 7 percent (for truss spacings up to 25 ft.) when the purlins are open-web members. In a building with a 20-ton crane, the corresponding decrease ranges from about 1.3 to 3.2 percent (for truss spacings up to 20 ft.). The larger decreases are involved in the case of the greater spacings of trusses. These figures show that very definite savings in steel are effected when the purlins are open-web members. From the standpoint of conservation of steel, the advantages of open-web purlins are such that they should be used wherever possible.

Steel roof deck is frequently used in mill buildings. Relative to this it is interesting to note that in such buildings which have a crane (Table A), the increase in the total amount of steel (as compared with that type of roof which involves the least amount of steel) ranges only from 2 to 10 percent when a Type 21 roof is used, even though this has a steel roof deck. The least amount of increase is involved in the case of the 20 ft. and 25 ft. spacings of trusses.

For a building without a crane, in which the purlins are solid-web members, additional conclusions can be drawn as follows:

For all conditions of purlin spacing and truss span, Type 12 construction requires the least amount of steel. Similarly, with the exception of the 6 ft. 6 in. purlin spacing up to a truss span of about 75 ft., Type 20 requires the greatest amount of steel.

The amount of steel required when a Type 14 roof is used is somewhat greater than Type 12 but is less than the other roof constructions, for truss spans up to about 122 ft. The difference in the amounts of steel required for Types 12 and 14, for any given purlin spacing, is approximately constant.

As between Types 18 and 19, the latter requires more steel than the former by an amount which is about constant for any given purlin spacing.

Although for truss spans up to about 80 ft., Types 22 and 23 require a greater amount of steel than Types 12, 14, 18, and 19, for greater truss spans, Types 22 and 23 (particularly Type 22), at the purlin spacing involving the least amount of steel, require a greater quantity of steel than Type 12 and 14 only, and a lesser amount of steel than the other types of roof construction indicated. Further for truss spans in excess of about 123 ft., Type 12 is the only roof construction which involves a lesser amount of steel than Type 22, when the latter is used at the purlin spacing which requires the least steel.

In connection with buildings in which the roof trusses are supported by masonry walls, Table C should be of interest. The amounts of steel required in the roof deck, sub-purlins, purlins, trusses and bracing between trusses are as indicated therein. The maximum range in the use of steel is indicated also.

For the types and spans of roof trusses referred to herein, the study indicates that the approximate weight of a steel roof truss may be determined from the following empirical formula:

$$w = \left[2.00 + \frac{L^2}{5000}\right]\left[1 + 0.017\,(n - 40)\right]$$

where w is the weight of truss in lb. per sq. ft. of horizontal area supported, L is the span in ft. and n is the total superimposed load in lb. per sq. ft. of horizontal area. This formula is shown graphically in Fig. 3. It was developed from the calculated weights for six trusses for each of two total superimposed loads of 40 and 56 lb. per sq. ft. as follows: 66 ft., 68 ft., (average 67 ft.), 99 ft., 102 ft., (average 100 ft. 6 in.), and 132 ft., 136 ft., (average 134 ft.). It was compared with a number of formulas as recommended by various authors. This comparison is illustrated in Fig. 4 which shows the graphs for the various formulas, based on a total superimposed load of 40 lb. per sq. ft. and a number of spacings of trusses as shown. These spacings of trusses for the several spans were selected in order to make the conditions comparable for the several formulas.

The formula as given herein, for spans between 67 and 134 ft. and for total superimposed loads ranging from 40 to 60 lb. per sq. ft., probably, is accurate within a range of about —4% to +8%. For spans less than 67 ft. and greater than 134 ft. and for other loads, the formula may be less accurate. It will be noted that for spans from 67 to 134 ft., the formula gives weights which are less than those determined from most of the other formulas. This is to be expected, particularly in the case of those formulas which were developed a number of years ago when working stresses were less than those in common use at the present time.

The study suggests that the weight of a truss (total superimposed load of 40 lb. per sq. ft.) may be approximated as a straight line variation, ranging from about 2.00 lb. per sq. ft. for a span of 40 ft. to 6.75 lb. per sq. ft. for a span of 160 ft. This would yield weights slightly in excess of those determined by the formula suggested herein (for spans ranging from about 60 to 130 ft.) and would be close to those obtained from the Fowler (light loads) and Carnegie formulas.

As an aid to judgment and a guide, the total amount of steel (roof deck, sub-purlins, purlins, trusses, bracing between trusses in the planes of the top and bottom chords thereof, columns and footings) required in a typical bay of a building in which there is no crane can be determined approximately from the following empirical formula:

$$w = 10.25 + \frac{(L - 40)^2}{3000}$$

where w is the total amount of steel in lb. per sq. ft. of floor area and L is the span of the truss in ft. The formula is shown graphically in Fig. 2. Because of the number of varying conditions which are a factor in determining the total amount of steel required, this formula, probably, is less accurate than the foregoing one for roof trusses but should be of general assistance.

In those cases where the nature of the manufacturing operation is such that the conditions are adverse, such as buildings in which corrosive gases are present constantly, it may be desirable to use heavier sections than would be used ordinarily. In such instances the amounts of steel required would be in excess of those indicated herein.

In a building in which the end bents are the same as an interior bent (refer to subsequent discussion under "Side Walls and End Walls") the unit weights of steel required in the typical bays of a building of n bays would be $(n+1)/n$ times the unit weights indicated herein. However, in order to arrive at a proper figure, there should be *deducted* from the total amount so obtained the weight of the steel in one bay for all members above the trusses (i.e., the steel in the roof deck, sub-purlins and purlins) and for the bracing between trusses. On the other hand, in a building in which the end bents are not the same as an interior bent, the unit weights of steel required in the typical bays would be $(n-1)/n$ times the unit weights indicated herein. In such a case, in order to arrive at a proper figure there should be *added* to the total amount so obtained the weight of the steel in one bay for all members above the trusses and for the bracing between the trusses.

Side and end walls

The quantities of steel in the side and end walls bear no particular relation to the floor area or type of roof construction. Consequently, no specific study was made of the side and end walls. However, the amount of steel required in these portions of a building are, approximately, as indicated in the following paragraphs.

The amount of steel in the side wall framing (eave strut, longitudinal bracing at upper part of columns, girts and window framing) may be estimated at 1.25 lb. per sq. ft. of *gross side wall area* (more or less).

The type of framing in the end wall and the amount of steel therein is dependent upon the matter of possible future additions to the building. If it is anticipated that, in the future, the building will be extended at its ends, the bent at the end should be the same as an interior one and the building closed in by a temporary wall. If no future addition is anticipated, the end wall may be supported by girts and columns and the roof by a channel rafter. In the latter case, the amount of steel in the end wall framing (corner columns, intermediate columns, bracing at upper part of columns, girts, window framing and channel rafters) may be estimated at 5.50 lb. per sq. ft. of *gross end wall area* (more or less).

The figures indicated in the foregoing paragraphs for the side walls and end walls do not include the weight of any steel siding.

General comments

From the standpoint of heat insulation there are a number of such materials available in which no steel or other critical material is involved and by the use of which the various types of roof construction can be put on the same basis so far as their resistance to heat transfer is concerned. Therefore, the subject of insulation was considered as being irrelevant to this study.

Also the subject of costs was considered as being irrelevant inasmuch as the main purpose was to study the design of steel mill buildings primarily from the standpoint of conservation of steel.

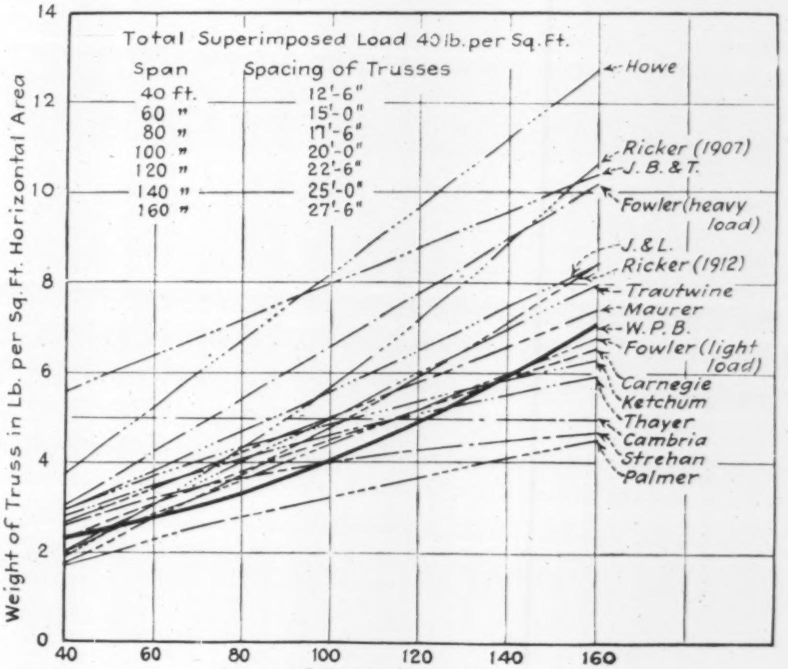


Fig. 4. Comparison of weights of roof trusses obtained by various formulas including the one developed in this study.

TABLE D—TOTAL AMOUNTS OF STEEL REQUIRED IN TYPICAL BAY OF BUILDING IN WHICH RAFTERS, PURLINS, TRUSSES AND COLUMNS ARE OF WOOD

Lb. per Sq. Ft. Floor Area

Purlin Spacing	Roof Type												Max Range in % of Least Amount of Steel Required
	(3)	(1)	(2)	(4)	(26)	(5)	(6)	(7)	(8)	(9)	(13)	(25)	
15′–0″ Spacing of Trusses (Average Span of Truss 67′–0″)													
5′–6″	0.96	0.98	0.98	1.11	1.20	1.67	1.66	2.15	2.33	2.33	2.75	2.88	200
6′–6″	0.96	0.98	0.98	1.11	1.20	1.67	1.74	2.19	2.33	2.33	3.25	3.38	252
7′–6″	0.96	0.98	0.98	1.11	1.20	1.67	1.83	2.19	3.40	*	3.63	3.76	291
8′–6″	0.96	0.98	0.98	1.11	1.20	1.80	1.82	2.65	3.86	*	3.63	3.76	291
20′–0″ Spacing of Trusses (Average Span of Truss 100′–6)													
5′–6″	0.95	0.97	0.97	1.10	1.19	1.66	1.66	2.14	2.32	2.32	2.74	2.87	202
6′–6″	0.95	0.97	0.97	1.10	1.19	1.66	1.74	2.18	2.32	2.32	3.24	3.37	254
7′–6″	0.95	0.97	0.97	1.10	1.19	1.66	1.83	2.18	3.39	*	3.62	3.75	294
8′–6″	0.95	0.97	0.97	1.10	1.19	1.79	1.82	2.64	3.85	*	3.62	3.75	294
25′–0″ Spacing of Trusses (Average Span of Truss 134′–0″)													
5′–6″	0.92	0.94	0.94	1.07	1.16	1.63	1.64	2.12	2.28	2.30	2.71	2.84	208
6′–6″	0.92	0.94	0.94	1.07	1.16	1.63	1.72	2.16	2.28	2.30	3.21	3.34	263
7′–6″	0.92	0.94	0.94	1.07	1.16	1.63	1.81	2.16	3.35	*	3.59	3.72	304
8′–6″	0.92	0.94	0.94	1.07	1.16	1.76	1.79	2.62	3.81	*	3.59	3.72	304

* Not adaptable for these purlin spacings.

Note: Amounts indicated are those required for the roof deck itself, sub-purlins and for such miscellaneous items as nails, spikes, wire staples, lag screws, tension rods with turnbuckles, steel plate washers, bearing plates, splice plates, base plates, etc., which would be necessary as fittings in connection with the wood rafters, purlins, trusses, bracing between trusses, and columns, and for reinforcing steel for footings.

Various types of roof construction supported on wood trusses and wood columns also were studied, as shown in the tabulations accompanying:

In a building with any of the foregoing types of roof construction supported on wood trusses and wood columns, there is some steel required for the roof deck itself, the footings and for the various miscellaneous items for the rafters, purlins, trusses, bracing between trusses, and columns. The total amounts of such material required in a typical bay are indicated in Table D.

Obviously, the least amount of steel is required in a building when material other than steel is used in as many of the elements of construction as possible. Most of the types of construction indicated in Table D, under normal conditions, are not commonly used and are not generally accepted as being in accordance with good engineering practice. However, the combination of wood rafters, wood purlins, wood trusses and wood columns with the various types of roof construction shown in Table D does conserve steel, as the figures indicate. For these combinations, the amount of steel required in a typical bay of a building ranges from about 0.90 to 3.80 lb. per sq. ft. of floor area. The least amount of steel is involved when Type 3 (or Type 1) roof construction is used. The range in the use of steel, depending upon the type of roof employed, is as indicated in the table.

The constructions indicated in Table D, of course, use less steel than those in Tables A and B. However, if, in order to meet the current national emergency, such constructions are used, from the standpoint of resistance to fire and possible conflagrations with attendant impeding of the war effort, it is advisable to use those types in which the combustible wood members are of the larger sizes spaced relatively far apart and which have an incombustible roof deck.

In order to minimize the fire hazard and yet to conserve as much steel as possible, the use of reinforced concrete for columns and crane girders, wood for trusses and purlins (larger sizes of wood members spaced relatively far apart), and an incombustible roof deck is suggested further by the study.

Type	Roof Construction for Timber Buildings
1.	Wood deck, wood rafters, wood purlins.
2.	Non-reinf. gypsum poured on permanent board form, wood rafters (16 cc.), wood purlins.
3.	Non-reinf. gypsum poured on wood plank, wood purlins.**
4.	Reinf. gypsum poured on permanent board form, wood rafters (36 in. cc.), wood purlins.
5.	Precast reinf. light-weight concrete tile, wood purlins.**
6.	Poured reinf. gypsum suspension system, wood purlins.**
7.	Reinf. gypsum poured on permanent board form, steel sub-purlins, wood purlins.
8.	Precast reinf. gypsum tile (short span), steel sub-purlins, wood purlins.
9.	Reinf. gypsum (metal edge) plank, wood purlins.**
13.	Steel deck, wood purlins.**
25.	Reinf. light-weight concrete poured on steel deck, wood purlins.**
26.	Reinf. light-weight concrete poured on paper-back wire lath permanent form, wood rafters (36 in. cc.), wood purlins.

** No rafters or sub-purlins are necessary in these types.

Roadside Reflector Buttons Cut Highway Accidents

Roadside reflector buttons placed every 100 ft. along the highway have helped reduce night accidents from 20 to 25 percent on two heavy-traffic roads in Michigan, while the accident rate on comparable unprotected highways in the state mounted 5 to 16 percent, according to the American Public Works Association.

The reflectors, which give road visibility as far as a mile ahead, are in use along highways between Detroit and Lansing, and between Pontiac and Toledo. On the former highway the traffic accident reduction was 25 percent; on the latter, 20 percent.

Michigan pioneered with the roadside reflectors.

Notes on the Public Works Congress

Faced with a multitude of new problems created by wartime activities, members of the American Public Works Association met at Cleveland Oct. 18-21 to exchange ideas. From the papers presented at the technical sessions the following extracts have been chosen with the belief that the information they contain may be of wide usefulness. The subject matter covers many phases of municipal administration and operation, including salvage methods, traffic control, civilian defense, refuse disposal and financial programming. One paper in the group, on sewage disposal practice under war conditions, was published in the issue of Nov. 5, p. 633. A news account of the meeting, containing the names of the new officers of the association appeared in the issue of Oct. 29, p. 603.

IN A SYMPOSIUM on municipal salvage operations the following significant comments were made:

Collection of tin cans from refuse must be stepped up—some 100,000 tons annually will be obtained at the present rate—but the total available supply is more than ten times that amount. Every gross ton of cans contains 2,218 lb. of steel scrap and 22 lb. of tin. These materials are wasted if cans are sent to dumps or incinerated. Incineration does not burn off the tin; it burns it *in*. After that treatment, no known method can separate it from steel, with the result that the tin is lost, and the scrap steel is "poisoned" with a high tin content.—*R. K. White, chief, general salvage section, War Production Board, Washington, D. C.*

Even rusty tin cans are valuable for their tin and steel content. Despite the fact that a can may be rusty, almost as much tin can be recovered as when it was new. Therefore, contrary to popular belief, cans may be stored in the open for several months without deterioration, so far as salvage value is concerned. — *Stanley Pinel, special consultant, War Production Board, Washington, D. C.*

At Highland Park, Michigan, a rubbish sorting system was installed in 1940, primarily as a means of reducing the amount of refuse to be hauled to the dump, some 18 miles from the city. Today the system is proving to be most effective in recovering salvageable material useful to the war. Here is what was obtained in one year from 60,515 tons of rubbish: 340 tons glass; 704 tons tin cans; 244 tons scrap iron; 284 tons paper; 19 tons rags; and 9,676 milk bottles.—*J. H. Morehouse, superintendent of public service, Highland Park, Mich.*

Civilian defense needs

There is a very important service in civilian defense activities to be rendered in each community by technical men, among whom the public works officials are included. It is necessary that somebody capable of judging such matters check on the suitability of shelters selected in the initial survey, which was necessarily made hastily. Only the trained man can see at a glance that a particular shelter, otherwise well selected, may be especially endangered by the immediate presence of live steam pipes, high tension wires or storage of dangerous materials like ammonia or gas. It is almost inevitable that many of the shelters originally chosen were not examined critically and that such an examination will show up the desirability of many changes.

Another need for technical men in connection with civilian life — and this is a most important one if and when air raids actually are upon us —is to have in each community besides the wardens, medical teams and fire fighters, the necessary number of teams of technicians capable of analyzing the immediate results of enemy action from the air and of advising the city executives of exactly what is the best thing to do. There should be in every city a group who have studied this matter, and studied the locality in which they are to operate and who will go out immediately upon conclusion of the raid, or even before, and examine what has happened and guide the efforts which have to be begun immediately to restore the damage done.

This same technical board or committee, or whatever you call it, should be prepared to make immediate observations on the spot of the effects of different kinds of bombs upon our types of construction. It must be remembered that the construction of European buildings differs widely from ours, and that the effect of blasts and high explosive shells may not be the same. Such information is of real practical importance as military intelligence and should include the discovery of any indications of new types of bombs, their characteristics and their effects both on human beings and structures. The British have found such air raid intelligence most helpful not only in perfecting their civilian defense measures but also in indicating to their own offensive forces the best mode of attack against targets of different kinds of construction. —*Brig. Gen. U. S. Grant III, chief, protection branch, Office of Civilian Defense, Washington.*

Discussion—Civilian defense activities in New York City are organized in five major divisions that make up the Citizens Defense Corps; these divisions are: Police, Fire, Medical, Welfare and Public Works. In the latter division there is enlisted the services of every engineer and architect employed by the city, as well as many volunteers from private practice. While the OCD booklets on civilian defense measures have been most helpful, it was not possible to adopt all recommendations as outlined because of local functional and geographic conditions. In developing the organization of personnel every endeavor was made to assign men to duties for which they already were qualified. This practice eliminated the need for special training to develop new skills; the only training given to civilian defense workers was that necessary for quick mobilization and maintenance of discipline. —*Irving V. A. Huie, commissioner of public works, New York City.*

Wartime traffic problems

Highway and traffic engineers must revise traditional thinking and become transportation engineers because of the exigencies of war. To make the most of little is a high challenge to our ingenuity, persistence and craftsmanship.

Here are some of the ways to aid in meeting wartime traffic needs:

To determine what is most needed, make all possible use of accident records. Every accident is a symptom of something wrong in the highway or in the way it is used. Accident records reflect the shifting of traffic concentration from one street or area to another and also the changing characteristics of that traffic. Thus they show the engineer, the police, the driver licensing authority, the educator, how to use his limited time and money to the greatest advantage.

Determine and mark preferred routes for use of essential traffic to and from war plants and by-pass routes for other traffic.

Use "preventive maintenance" to keep essential routes in first class condition. Pavement holes delay traffic, reduce capacity, ruin tires and cause accidents. If desired materials and equipment cannot be had, use substitutes.

To increase the capacity of these same essential highways, make minor improvements such as easing sharp curves, fixing shoulders, removing view obstructions. Ingenuity plus substitute or temporary materials will often help traffic greatly at little cost.

Remove traffic signals and signs from places where they are no longer needed, and put them in new places where heavy traffic demands them. The 35-mile speed limit, plus the reduction in traffic volume in many places, means that many intersections can get along without a signal or four-way stop signs (a nuisance at the best). Unnecessary stops burn up rubber.

Where essential traffic requires the whole roadway, don't hesitate to prohibit parking at all or certain hours. Turn a deaf ear to the squawks of a few who may be inconvenienced.

Prohibit left turns, and even cross-traffic, at points where essential traffic is very heavy.

Contribute engineering knowledge to the planning of staggered hour programs. Such a program started without the most careful analysis may do more harm than good. City engineers may well work with the local transit company, manufacturers, merchants, schools and others in collecting and studying data on the numbers of people who must take certain journeys at certain times and how this relates to the available mass transportation facilities, and then devising a staggered hour program which will provide the greater relief. —*Sidney J. Williams, director, public safety division, National Safety Council, Chicago, Ill.*

Refuse disposal problems

Nation-wide emphasis placed on salvage of metals, rubber and paper has provided a problem of no mean proportions to municipal officials. The practices and plants of many cities, designed to meet the requirements of sanitary and economical disposition of city waste, are not readily adaptable to the recovery of salvageable materials. This difficulty has given rise to the independent civic salvage schemes, including the neighborhood depot set-up for salvage donations and large-scale intensive drives for metal scrap.

In Washington, the city contributes a considerable poundage of valuable grease from its garbage reduction plant and it so happens, the remainder of its garbage is pork-producing. Further to cooperate in salvaging, it arranged for recovery of tin-cans as well as metal scrap from the incinerator residue.

Cities in which garbage is disposed of by the reduction process are today enjoying a good price for grease sales and are contributing directly to the war effort in their production of a grease which in addition to its saponifiability contains about 12 percent of glycerin. Effective on Aug. 1, 1942, the Office of Price Administration decreed a price ceiling on various greases which had the effect of fixing garbage grease at a ceiling of about 6⅝c. per pound, f.o.b. This is in accord with national policy on inflation control and is accepted as such. It is interesting to note that in World War I, the price rose to a peak of 13c. per pound.

The hog-feeding cities have received another blow, of more or less consequence depending on geographic location, in the amendment to the U. S. Public Health Service quarantine regulations requiring that all garbage shipped interstate shall be cooked before being fed to hogs. The purpose of the Public Health Service in promulgating this regulation is to control trichinosis. To the city disposing of its garbage by interstate shipment for hog-feeding, it presents an almost insurmountable problem in that the farmer can ill-afford the additional expense of cooking, assuming that the necessary equipment could be acquired, which is doubtful in these times. Should existing arrangements for disposal of the staggering tonnages of garbage produced in large cities be jeopardized by unreasoning enforcement of such new regulations in time of war, the public health objective must be weighed against the consequences, namely: (1) Cities so concerned would be confronted with the adoption of alternate methods of garbage disposal at a time when the construction of incinerators, reduction plants, grinding stations and the like is practically an impossibility; and (2) the nation would be deprived of many hog-producing farms.

In conclusion, it can safely be predicted that hard times are ahead on all counts. On the other hand, municipal sanitation problems may receive more favorable treatment in the future by reason of their being brought into the limelight as essential and vital functions of government. —*William A. Xanten, supervisor, city refuse division, Washington, D. C.*

Discussion — In a recent survey among some cities in the south it was revealed that the No. 1 problem is labor turn-over; it is difficult to obtain and hold men for refuse disposal operations because wages and working conditions in other forms of activity are much more satisfactory. In addition, it is most difficult to get maintenance parts for trucks and other equipment which are being put to strenuous service because of increased refuse production. In New Orleans, for example, provision must be made for the disposal of enormous quantities of spoiled food, as well as for disposal of extra waste emanating from military establishments and ships arriving at the port. In Atlanta, the city has discontinued collection of tree trimmings and garden waste in order to reduce trucking and save rubber.—*Carl Schneider, consulting engineer, New Orleans, La.*

Drainage of airport pavement

Provision must be made for the prompt removal of rainfall from airport pavements, especially runways. Planes landing in water of appreciable depth may be damaged by water thrown up by the rapidly moving wheels.

It is not sufficient to drain the water off to unpaved areas as this would soften the ground so that planes would mire down if they got off the pavement. Provision must be made for getting the water from both paved and unpaved areas into underdrains where it is conducted off the field. An adequate outlet should be provided as the efficiency of an otherwise excellent drainage system may be ruined by an outlet which does not permit rapid discharge of the water which has been collected.

Somewhat in conflict with the need for quick drainage of runways is the desirability of keeping the crown to a minimum. Planes have a tendency to swerve to one side of a runway which is too highly crowned. The crown on a concrete paved runway may be kept low because construction methods and equipment permit the surface to be so accurately formed that water pockets are avoided. A transverse slope of $\frac{1}{10}$ in. per ft. will provide ample drainage.

Several shapes of crowns have been used and all are reported to have given good results. In the normal crown, the water drains each way from the center and provision must be made for intercepting it along each edge of the runway. In some cases the edge of the runway is turned up slightly so as to drain the water to a row of inlets located 10 or 15 ft. from the runway edge. This scheme was used on the Rhode Island State Airport and the authorities report that in the seven years since it was built it has functioned perfectly.

In other cases a drain is laid along the edge of the runway in a trench which is backfilled with crushed stone or gravel. When this scheme is used the surface layers should be of coarse material, bound with bitumen in such a way that water may drain through but the stones are kept off the runway. This is important as loose pebbles or stone chips on an airport runway are a source of considerable danger to airplane propellers, fabric and other equipment.

Several airports have been constructed with an inverted crown, the water draining from both edges to a line of inlets along the center of the runway. This scheme requires only one row of inlets and the airports which have used it report that it is satisfactory. However, it is not favored by engineers of the Civil Aeronautic Authority who fear accumulation of water on the runway should the drainage system become inoperative for any reason.

Recently there has been a tendency to construct runways, aprons and taxiways with the slope all in one direction. Where the topography and the grades on intersecting pavements make it practical this seems to be a satisfactory solution. Only one line of drainage inlets is required and yet there is no danger of trapping water on the pavement.

Instead of using a line of drainage inlets along the edge of the pavement, several airports have intercepted the runoff in a continuous concrete channel with a grill covering. At intervals this channel is connected to the underdrains.—*L. M. Arms, engineer highways and municipal bureau, Portland Cement Association, Chicago.*

Financial programming

Financial problems of any city are in some degree peculiar to itself. However, we can start with the fact that all cities have financial problems, and that, by and large, they are the same problems, differing only in intensity and in relation to each other. Rochester has the ordinary problems of a fairly large per-capita debt, a fairly high per-capita real estate tax, a problem of maintaining assessed valuations, and of operating under state restrictions as to character and amount of revenues and tax levies. It has, however, made a definite attempt to chart its financial course for a number of years into the future.

The conclusions reached as a result of this study may be summarized as follows:

1. The city must be thoroughly studied and the trend of assessed valuations predicted. Every effort must be made through planning to hold or increase assessed valuations.
2. Utilities must be eliminated from the general problem by individual study, to the end that they shall be at least self-supporting. A definite planned policy should be adopted for excess utility revenues.
3. Current expenses, including those for education and public welfare, must be studied and trends predicted as far as possible. This study should include a planned approach to a scientific provision for maintenance and reconstruction of public works.
4. A pay-as-you-go basis for both current and capital expenditures should be adopted after a reasonable period of transition.
5. On all capital projects requiring borrowing, the citizens should be allowed to express their approval or disapproval at an election.
6. Revenues must be studied and trends predicted. The ability of the taxpayer to pay taxes must be considered in this study.
7. Debt maturities and interest payments should be studied and steps taken to equalize such payments upon a descending scale, permitting declining tax rates but requiring adequate debt retirement.
8. Some factors of flexibility must be left in any financial program.
9. The use of citizen financial advisory groups, unofficial in character, can be extremely helpful to the public official.—*Louis B. Cartwright, city manager, Rochester, N. Y.*

Refuse Collections Are Timed at Richmond

Time clocks to check on refuse collection costs in terms of hours and tons have been installed at its refuse dumps by Richmond, Va., according to the American Public Works Association.

Dates and times of arrival of loads of ashes and rubbish are recorded by the clocks on cards furnished the truck drivers. The cards serve also as a record of gas and oil consumption, miles traveled, and total number of loads delivered to the dumps by each truck.

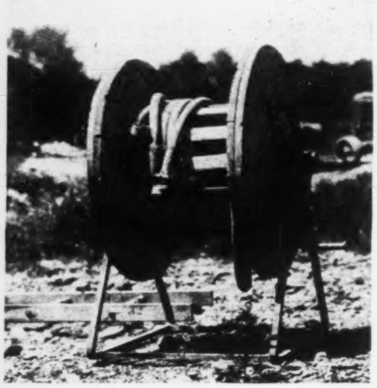
Unit cost of refuse collection for Richmond was 38c. per cu. yd. last year, first year of the time clock installation. This cost is said to be considerably below that of cities of comparable size.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

No Waste of Rubber Here

On an eight-mile Pennsylvania highway project near Bartonsville, the Central Pennsylvania Quarry Stripping and Construction Co. is using to great advantage the job-made air-hose reel shown below. Made from scrap steel and a cable reel equipped with a crank, the reel avoids kinks and wear in handling and storing hose. On good surfaces the frame can be tipped over and the reel used as wheels for moving the hose.



New Quarry Drills From Worn-Out Steel

Oxyacetylene welding makes it possible to reclaim steel drills that are no longer of sufficient length to be serviceable by joining two short drill to make one long one, according to a brief description of the method in *Oxy Acetylene Tips*. In addition, oxyacetylene welding offers a convenient means of making extra-long drills from standard drill lengths.

At the quarry where the welding procedure was first developed, most of the work is on jackhammer drills and wagon quarry drills, either hexagonal in section, $\frac{7}{8}$-in. wide, or round and of $1\frac{1}{4}$-in. diameter. Some 400 drills are salvaged each year by this method.

The first step is to take two similar drills that are too short for use and cut off the shank from one and the drill end from the other. The two long sections that reman can then be joined to form a complete drill of the desired length. The joint is prepared for welding by machining each cut end to a bevel of 35 deg. The two sections are next lined up on a 2-in. angle iron, which is supported by V-blocks, and the edges of the joint are spaced about $\frac{1}{16}$ in. apart. Use of the angle iron permits easy alignment of drills of various diameters.

A small continuous tack-weld is made at the base of the V, completely around the joint, while a helper turns the drill sections. The weld area is preheated for a distance of 2 to 3 in. on either side of the joint, so that during the actual welding the weld will not cool too rapidly through the dissipation of heat into the cold surrounding metal. The main weld is then made, with care taken to obtain good penetration with the initial tack-weld and with the side walls of the joint, which should be melted down about $\frac{1}{16}$ in. At the same time care should be taken to avoid overheating the metal, which would be indicated by sparks.

As soon as the weld has been made and before it has had a chance to cool, the drill is removed from the angle-iron support, checked for straightness, and replaced in the angle-iron. The area on either side of the weld is then reheated to assure the slow cooling necessary to achieve a ductile, shock-resistant weld.

Pressures in Pneumatic Tires

Over the long distance telephone the construction superintendent was talking to the big boss: "We're having a terrible time up here with tires on the big carrying scrapers. The rate of wear is too high and we're getting some bad breaks in the tire walls. With the rubber situation what it is, we've got to find some way to stop this."

"What air pressure are you carrying in those tires?" asked the boss. "Why, 65 lb., exactly what the manufacturers recommend," said the super.

"Well," said the boss, "you increase that pressure immediately to 100 lb. and let me know what the results are."

Later on the super reported that excessive wear stopped when the pressure was raised and that there were no more breaks in casings. This experience is cited by the boss in support of "a tire pressure enough to prevent flexture of the casing walls under load."

Editor's Note: The above is an actual incident cited by a prominent contractor.

LIGHT TOWER FROM SCRAP

At a dam now under construction by the U. S. Engineers in southern Pennsylvania, tubular steel frame light towers of the type below are proving very valuable. This all-welded structure, which was built before steel became critical, has been surmounted by four 1,500-watt lights on brackets that can be easily adjusted. The steps welded to left front leg permit a workman to climb up easily to the lights. A gasoline-engine generator provides the necessary current. The tower was constructed by the general contractor building the dam.

RITECURE

for all Concrete Construction

IN CURING CONCRETE

It's the Solids that Count

The RITECURE Film with 60% Solids gives Wide Coverage and Perfect Curing

FILM or membraneous curing of concrete structures is simple and economical. For vertical surfaces it provides about the only practical way of curing at all. There's no haulage of bulky materials. No constant wetting down. No cleaning up afterwards. No bulky storage between jobs.

But the film to be fully effective must be impervious over its entire surface and stay that way throughout the critical curing period. Obviously the amount and character of solids remaining after the carrier has evaporated are important.

RITECURE contains 60% solids. It dries into a thin but tough film with considerable elasticity. Its spreading qualities assure full coverage without the need of excess amounts. It forms a moisture-sealing film lasting well through the curing period. The color indicator disappears in a few hours. It's value is obvious.

- Write for literature telling all about RITECURE and listing some of the projects on which it has been used. More than 2,000,000 square yards of concrete a month are being cured with RITECURE. Smart Purchasing Agents are buying solids — not solvents.

RITECURE
The
TRANSPARENT
CURE

RITECURE

A Transparent Membrane for Curing Concrete

A Product of **THE JOHNSON-MARCH CORPORATION**
52 Vanderbilt Avenue, New York, N. Y.

RITECURE is sold by: THOMPSON MATERIALS CO.
New York, N. Y. • Belleville, N. J.

11-JM-1

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

EARTHWORK AND TUNNEL TUCUMCARI PROJECT, N. M.

OWNER: U. S. Bureau of Reclamation, Tucumcari Project, New Mexico.

PROJECT: Earthwork canal and construction of Tunnel No. 4 from Station 1603+75 to Station 1684+68 on the Conchas Canal, Tucumcari Project, New Mexico, located 12 to 15 miles northwest of Tucumcari, N. M. Earth canal runs from Station 1603+75 to Station 1607+54, and from Station 1679+36 to Station 1684+68. Tunnel construction, including portal structures and transitions begins at Station 1607+54 and runs to Station 1679+36. Typical tunnel section is supported by timbers and lined with 6-in. concrete lining. A coat of pneumatically applied mortar is required in some portions of the tunnel to prevent spalling or disintegration of excavated surfaces.

CONDITIONS: Contractor to furnish all permanent timbering; temporary tunnel timbering; materials used for filling spaces outside of permanent timber lagging in tunnel; gravel or broken rock for backfill around drain pipes; form materials; wire, wire ties and other securing appliances; temporary supports; water; calking materials; backfill material; rock, rock spalls, gravel and crushed rock for dry-rock paving; and other miscellaneous materials not part of completed structure necessary for completion. Government to furnish all other materials. These will be delivered to railroad siding at Tucumcari and contractor is required to transport to site of work. Time for completion, 750 calendar days. Temporary construction roads are available. Wage rates are: skilled labor, $1.00 to $1.50 per hour; semi-skilled, 55c. to $1.00; and common, 50c.

BIDS: Two bids were received October 6, 1942, the contract low of $752,205, and $838,350.

LIST OF BIDDERS:

1. Bressi-Bevanda Constructors, Inc., Los Angeles, Calif. (contract)	$752,205
2. J. F. Shea Co., Inc., Los Angeles, Calif	838,350

Item	Quan.	Unit Prices (1)	(2)
1. Excavation, common, for canal	17,000 c. y.	$1.25	$0.95
2. Excavation, rock, for canal	51,000 c. y.	1.25	.95
3. Remove loose rock above canal	300 c. y.	1.25	2.00
4. Excav., common, for tunnel outlet drain	50 c. y.	1.25	2.00
5. Excav., rock, for tunnel outlet drain	50 c. y.	1.25	5.00
6. Excavation, all classes, in tunnel	42,000 c. y.	9.50	13.40
7. Backfill	500 c. y.	1.25	1.00
8. Puddling or tamping backfill	200 c. y.	1.25	1.00
9. Concrete in tunnel lining	11,000 c. y.	14.00	11.50
10. Conc. in portal structures and transitions	210 c. y.	39.00	35.00
11. Pneumatically applied mortar	300 c. y.	50.00	30.00
12. Placing reinforcing bars	20,000 lb.	.09	.03
13. Furn. and erect permanent timbering in tunnel	600 M bm.	140.00	100.00
14. Drill grout holes, to 10-ft. depth or less	400 l. f.	.50	1.00
15. Place grout pipe and connections	200 lb.	.20	.25
16. Pressure grouting	800 c. f.	.50	1.00
17. Constr. 6-in. tunnel drain	1,800 l. f.	.50	1.50
18. Lay 6-in. sewer pipe with cemented joints	1,000 l. f.	.50	1.00
19. Dry-rock paving	300 s. y.	6.00	3.00

HIGHWAY, VIRGINIA

OWNER: Virginia Department of Highways, Richmond.

PROJECT: Construction of 5.1 miles of Highway No. 168, north of Newport News in Warwick County, Va. Of dual type pavement, the two outside lanes, each 11-ft. wide, are to be 9-in. plain concrete, and the 20-ft. center lane is to be bituminous surface.

CONDITIONS: Contractor to furnish all material and complete project by April 22, 1943. Rail, highway and water transportation facilities available. Winter construction methods to be necessary. Wage rates are: skilled labor, $1.50 per hour; semi-skilled, 90c.; and common, 50c. Construction of roadway in low area presents added drainage problems as water stays near ground surface after rains.

BIDS: Two bids were opened October 6, 1942, the contract low of $439,119, and $476,088.

LIST OF BIDDERS:

1. Hechler Brothers, Highland Springs, Va. (contract)	$439,119
2. Bero Eng. & Constr. Co., Blackstone, Va.	476,088

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	4 ac.	$300.00	$500.00
2. Regular excavation	21,089 c. y.	.75	.85
3. Borrow excavation	54,549 c. y.	1.15	1.20
4. Concrete, Class A	151 c. y.	45.00	45.00
5. Concrete, Class C	62 c. y.	40.00	35.00
6. Metal reinforcing	10,662 lb.	.10	.10
7. Conc. rt.-of-way monuments	10 ea.	3.00	5.00
8. 15-in. concrete pipe	459 l. f.	2.25	4.25
9. 18-in. pipe	1,353 l. f.	2.80	5.50
10. 24-in. pipe	990 l. f.	4.00	6.65
11. 24-in. concrete pipe	15 l. f.	4.00	6.65
12. Pipe to be relaid	1,295 l. f.	2.00	2.50
13. Radial concrete curb	108 l. f.	1.00	2.75
14. Std. h. e. s. concrete gutter	101 l. f.	2.50	2.50
15. Plain concrete curb and gutter	1,194 l. f.	2.00	1.75
16. Federal-aid project markers	3 ea.	5.00	25.00
17. Curb drop inlets	5 ea.	125.00	175.00
18. Standard drop inlets	1 ea.	125.00	150.00
19. Material for subgrade treatment	20,303 c. y.	1.30	2.35
20. 6-in. soil	560 c. y.	2.00	1.50
21. Soil (bring up irregularities)	3,737 c. y.	1.50	2.35
22. 9 to 18-in. soil	2,247 c. y.	1.50	3.40
23. Cinder block end walls to be rebuilt	77 c. y.	20.00	150.00
24. No. 9 stone or crushed gravel (stabilized)	9,346 ton	5.00	3.50
25. RT-3 or RT-4 bituminous material	20,158 gal.	.20	.15
26. RT-5 or RT-6 bitum. material	30,238 gal.	.20	.15
27. Grade B sand	604 ton	4.00	3.15
28. Cover material	2,268 ton	6.00	2.50
29. High early str. conc. (street approaches)	384 s. y.	4.00	1.75
30. 9-in. plain concrete	66.584 s. y.	3.35	3.65

TRACK REMOVAL, STREET REPAIRS SEATTLE, WASH.

OWNER: City of Seattle, Wash. C. L. Wartelle, city engineer.

PROJECT: Removing street railway tracks, repairing, and restoration of First Avenue and First Avenue, South, from Denny Way to Atlantic Street in Seattle, Wash. Work to be carried on center of street with heavy traffic being maintained on both sides throughout the day.

CONDITIONS: Contractor to furnish all materials and complete project in 90 days. Rail and water transportation available to city, and highway to site of work. Wage rates are: skilled labor, $2.00 per hour; semi-skilled, $1.50; and unskilled, $1.10.

BIDS: Three bids were opened August 6, 1942, ranging from the contract low of $88,221 to $94,580.

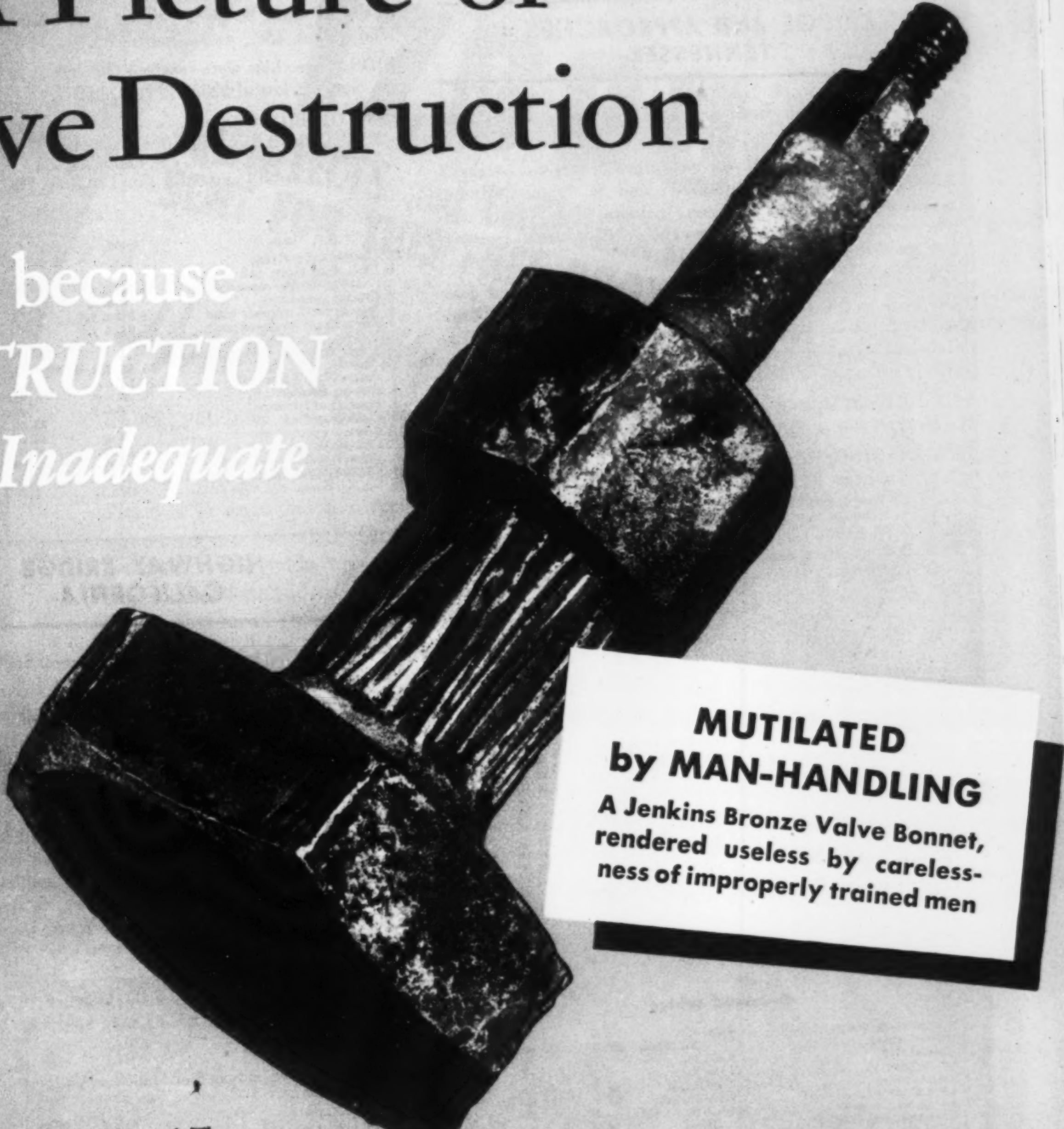
LIST OF BIDDERS:

1. T. Romano, Seattle, Wash. (contract)	$88,221
2. Argentieri & Colarossi, Seattle, Wash	91,409
3. M. Moschetto, Seattle, Wash	94,580

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove asphalt or brick surfacing	27,800 s. y.	$0.50	$0.40	$0.45
2. Remove street railway tracks	54,000 l. f.	.15	.25	.25
3. Concrete base in rail voids	415 c. y.	7.75	8.00	7.75
4. Concrete base, variable thickness	3,130 c. y.	8.00	8.00	8.00
5. Adjust granite curb	200 l. f.	1.50	2.00	1.00
6. Fir timber, bolted to exist. granite curb	50 l. f.	1.00	1.00	3.00
7. Replace concrete sidewalks	50 s. y.	2.00	2.00	2.00
8. Filling catch basins	4 ea.	5.00	10.00	10.00
9. Adjust manholes, covers, etc	62 ea.	8.00	10.00	10.00
10. Adjust monument cases	10 ea.	8.00	10.00	10.00
11. Monument cases	23 ea.	20.00	20.00	15.00

A Picture of Valve Destruction

... because *INSTRUCTION* *was Inadequate*



MUTILATED by MAN-HANDLING

A Jenkins Bronze Valve Bonnet, rendered useless by carelessness of improperly trained men

THIS valve never had a chance! The neck of the bonnet is crushed, and the threads within distorted, rendering the spindle inoperative. Some heavy-handed workman applied a pipe wrench to the neck when trying to loosen the packing nut, which had been improperly turned down (with a wrench) so tight that it jammed.

Had the packing nut been turned down properly *(finger-tight only)*, it could have been removed easily with a hexagon wrench without touching the neck of the bonnet. The damage could have been avoided, and the bonnet preserved for many more years of service. No wrench of *any* kind should ever be used on the bonnet neck!

Since bronze is one of the scarcest of the critical metals, and bronze valve parts almost unobtainable, careless destruction of this kind must be prevented.

You can help to promote valve conservation, and reduce production slowdowns due to valve failure! Select valves for new construction carefully. Recommend regular inspection ... replacement of worn parts before deterioration occurs ... thorough instruction of new maintenance workers.

Jenkins Engineers will give you any help you need in organizing a program of valve conservation.

Army-Navy "E" Pennant, awarded to Jenkins Bros. for meritorious achievement in the production of war material.

JENKINS BROS., 80 White St., New York, N. Y.;
Bridgeport, Boston, Atlanta, Philadelphia, Chicago.
Jenkins Bros., Limited, Montreal, London.

JENKINS VALVES

For every industrial, engineering, marine and power plant service . . . in Bronze, Iron, Cast Steel and Corrosion-Resisting Alloys . . . 125 to 600 lbs. pressure.

BRIDGE AND APPROACHES TENNESSEE

OWNER: Tennessee Department of Highways and Public Works, Nashville.

PROJECT: Construction of reinforced concrete overhead bridge over Nashville, Chattanooga and St. Louis Railroad, Tullahoma, Coffee County, Tenn. Includes plain cement concrete pavement, sidewalks, driveways, curbing, drainage structures, etc., for approaches to bridge.

CONDITIONS: Contractor to furnish all materials and complete work in 200 working days. Rail and highway transportation facilities available. Project has A-1-j preference rating. Minimum wage rates are: skilled labor, 75c. per hour; semi-skilled, 45c.; and common, 30c.

BIDS: Six bids were received September 4, 1942, ranging from the contract low of $287,686 to $355,912.

LIST OF BIDDERS:

1. H. B. Garrett, Ashland, Ala. (contract)	$287,686
2. Foster and Creighton, Nashville, Tenn	287,799
3. C. A. Thompson, Centerville, Tenn	302,934
4. V. L. Nicholson Co., Knoxville, Tenn	323,264
5. A. B. Long, Harriman, Tenn	331,150
6. J. M. Hickman, Harriman, Tenn	355,912

Roadway

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$750.00	$150.00	$100.00
2. Road and drainage excav., unclassified	2,303 c. y.	.80	.65	.50
3. Borrow excavation (common)	1,060 c. y.	1.10	.66	1.00
4. Culvert excavation (unclass.)	2,041 c. y.	2.00	1.20	1.50
5. Crushed stone (traf. bd. rdwy.)	50 c. y.	3.00	2.75	3.50
6. Cem. concrete pavement (plain)	5,358 s. y.	3.00	2.96	2.75
7. Class A concrete	28.6 c .y.	30.00	29:00	30.00
8. Class B concrete	1.6 c. y.	30.00	29.00	30.00
9. Brick masonry	19.72 M	60.00	66.00	60.00
10. Concrete sidewalk	6,441 s. f.	.25	.24	.25
11. Concrete driveway	556 s. f.	.50	.33	.35
12. Concrete curb	16.1 c. y.	30.00	22.45	22.00
13. Concrete, combined curb and gutter	72.9 c. y.	30.00	21.15	22.00
14. Treated timber catch basin covers	15 ea.	20.00	16.00	12.00
15. Treated timber manhole covers	9 ea.	20.00	16.00	12.00
16. 18-in. pipe culvert	338 l. f.	2.50	2.05	2.00
17. 24-in. pipe culvert	91 l. f.	3.60	3.40	3.00
18. 30-in. pipe culvert	1,165 l. f.	5.50	4.75	4.75
19. 10-in. vitr. clay or non-rein. conc. sewer pipe	63 l. f.	1.00	.90	1.00
20. 12-in. pipe culvert	259 l. f.	1.75	1.60	1.40
21. 15-in. pipe culvert	317 l. f.	1.85	1.70	1.60

Overhead Bridge

Item	Quan.	(1)	(2)	(3)
22. Dry excavation (bridges)	2,345 c. y.	5.00	1.70	2.00
23. Untreated timber	0.553 Mbm.	200.00	155.00	200.00
24. Structural steel	8,471 lb.	.16	.12	.20
25. Steel forgings	13,059 lb.	.24	.18	.22
26. Class S concrete	155.9 c. y.	45.00	53.00	50.00
27. Class A concrete	4,604.1 c. y.	27.50	31.00	34.00
28. Steel bar reinforcement	931,475 lb.	.06	.068	.06
29. Timber test piling (treated)	120 l. f.	4.00	3.45	3.00
30. Treated timber piling, Size 1	2,280 l. f.	2.00	1.00	2.00
31. Concrete test piling	600 l. f.	5.00	4.65	7.00
32. Concrete piling, Size 1	9,600 l. f.	3.10	2.31	3.00
33. 6-in. vitr. clay pipe drains	90 l. f.	1.00	.55	.60
34. 6-in. asbestos cement pipe	290 l. f.	1.50	1.80	1.00
35. Asbestos cement blast boards	482 s. f.	.30	.55	.50
36. Furn. and place all conduits, forming recesses for pullboxes and Niteday Reflectors for barrier curb	L. S.	3,500.00	3,000.00	1,000.00

HIGHWAY, FRANKLIN COUNTY GEORGIA

OWNER: Georgia State Highway Dept., Atlanta.

PROJECT: Paving 7.113 miles of Carnesville-Commerce Road in Franklin County, Georgia, with 7-5-7-in. plain concrete pavement. Includes clearing and grubbing, excavation, subgrade treatment, curbing, grassing shoulders, and drainage structures.

CONDITIONS: Contractor to furnish all materials and complete work in 140 working days. Highway facilities available to site of work. Wage rates are: skilled labor, 60c. per hour; semi-skilled, 45c.; and common, 30.

BIDS: Three bids were received October 2, 1942, ranging from the contract low of $208,812 to $230.274.

LIST OF BIDDERS:

1. W. L. Cobb, Inc., Decatur, Ga. (contract)	$208,812
2. Hugh McMath Constr. Co., Columbus, Ga	225,951
3. M. J. Carroll Contracting Co., Leesburg, Fla	230,274

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L.S.	$2,250.00	$10,000.00	$2,500.00
2. Unclassified excav. and borrow, including shoulder construction	13,407 c. y.	.45	.52	.70
3. Grouted stone apron	55 s. y.	3.00	3.00	3.00
4. Selected mat'l. subgrade trtmt	5,075 c. y.	.75	1.50	.90
5. Mix subgrade treatment mat'l	27,005 s. y.	.10	.10	.05
6. 7–5–7-in. plain cem. conc. paving with type B lumber sealed transverse joints	83,897 s. y.	2.13	2.20	2.41
7. Concrete raised edge curb	17,386 l. f.	.05	.12	.06
8. Grassing shoulders	76,939 s. y.	.045	.04	.03
9. Finishing and dressing	130,796 s. y.	.045	.04	.03
10. Concrete spillways, type 1	12 ea.	45.00	25.00	25.00
11. Concrete spillways, type 2	5 ea.	45.00	25.00	26.00
12. Concrete spillways, type 3	58 ea.	45.00	25.00	25.00
13. Concrete spillways, type 4	3 ea.	45.00	25.00	26.00
14. Concrete slope drain	410 l. f.	2.50	2.00	1.15
15. 8-in. Cl. B conc. pipe slope drain	357 l. f.	1.00	2.00	1.00

HIGHWAY BRIDGE CALIFORNIA

OWNER: California Division of Highways, Sacramento. C. H. Purcell, State Highway Engineer.

PROJECT: Construction of a timber, steel and concrete bridge across the Albion River at Albion, Mendocino County, Calif. Length approximately 969 feet. Involves dismantling steel bridge on Feather River and using salvaged materials and re-assembling at the new location.

CONDITIONS: State will furnish railroad rail for reinforcing, and salvaged structural steel for erection of steel span. Contractor to furnish all other materials and complete work in 200 days. Rail and highway transportation facilities available. Project has priority rating of A-2. Wage rates are: skilled labor, $1.00 to $1.75 per hour; semi-skilled, 80c. to $1.20; and common, 62½c. to 75c.

BIDS: Four bids were received September 16, 1942, ranging from the contract low of $345,528 to $391,430.

LIST OF BIDDERS:

1. Fred J. Maurer & Son, San Francisco, Calif. (contract)	$345,528
2. J. H. Pomeroy & Co., Inc., San Francisco, Calif. (bid irregular)	371,333
3. Trewhitt-Shields & Fisher, Fresno, Calif	390,805
4. E. E. Smith, El Cerrito, Calif	391,430

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$4,000.00	$5,500.00	$3,500.00
2. Remove and salvage exist. steel bridge across Feather River	L. S.	15,000.00	9,500.00	30,000.00
3. Structural excavation, type A	800 c. y.	10.00	6.00	18.00
4. Structural excavation, type B	2,400 c. y.	6.00	10.00	5.30
5. Rock and screenings (bit. surf. trtmt.)	305 ton	10.00	8.00	7.00
6. Liquid asphalt, SC–6	16 ton	35.00	90.00	40.00
7. Redwood timber	818 M bm.	205.00	205.00	198.00
8. Class A plain cement concrete (footing blk.)	320 c. y.	30.00	30.00	25.00
9. Class A plain cement concrete (towers)	450 c. y.	70.00	80.00	61.00
10. Class A plain cement concrete (struct.)	1,110 c. y.	35.00	40.00	38.00
11. Erect. salvaged struct. steel	137,000 lb.	.10	.07	.20
12. Furnish timber piles	9,760 l. f.	.30	.55	.35
13. Drive timber piles	244 ea.	30.00	90.00	125.00
14. Furn. precast conc. piles, incl. test piles	960 l. f.	3.00	5.00	5.00
15. Drive precast conc. piles, incl. test piles	48 ea.	100.00	100.00	125.00
16. Railroad rail straps	2,900 l. f.	.50	.25	.75
17. Splitting railroad rails	7,100 l. f.	.50	1.00	.50
18. Place railroad rail reinforcing	145,000 l. f.	.03	.03	.04
19. Bar reinforcing steel	34,000 lb.	.10	.03	.075
20. Mesh reinforcing	250 s. y.	2.00	1.00	.50
21. Misc. items of work	L. S.	8,000.00	6,000.00	1,500.00

17,000

ARCHITECTS and ENGINEERS SENT FOR THIS FREE BOOK

...Have You?

If not, you still can get your copy of *Typical Designs of Timber Structures* by writing us on your professional letterhead.

Plans of 45 representative types of timber structures are included. You will be interested in the wide range of structural possibilities featured, as created under the TECO System of timber construction; also in TECO's savings of time, materials, and money.

Write us now . . . before the present supply is distributed.

The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood.

TYPICAL DESIGNS
of
TIMBER STRUCTURES
A Reference for Use of Architects and Engineers
Compliments of
TIMBER ENGINEERING COMPANY
1337 Connecticut Ave., N. W.
WASHINGTON, D. C.
Property of
Book No 336

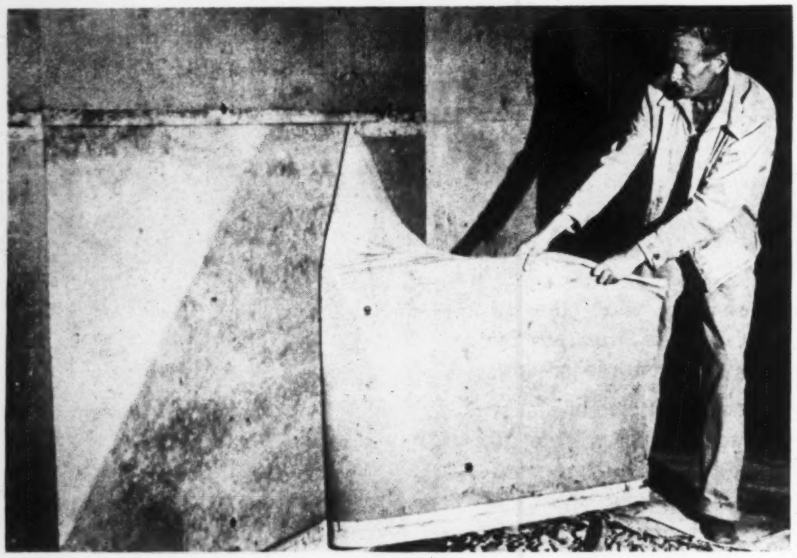
Timber ENGINEERING COMPANY

WASHINGTON, D. C.

PORTLAND, OREGON

New Aids to the Constructor

Equipment and material announcements and manufacturers' news



Increases Concrete Strength

A new product that is said to make concrete several times more resistant to weather and abrasion in dams, fortifications and construction projects of all types has been announced by the United States Rubber Co. The product is an absorptive lining for forms in which concrete is poured, and is known as "Hydron." By removing water and air bubbles from the surface of the concrete, Hydron produces a concrete that will last longer and will have a smoother and more pleasing finish, without brushing or scrapping, so the manufacturer asserts.

In one test, samples of concrete were held within two inches of an air blast delivering sharp steel grit. With concrete cast against Hydron, the particles bounced off the case-hardened surface, leaving a fairly perceptible mark. Hydron form linings consist of an absorptive material faced with a fabric. The linings are easily applied to the concrete forms by stapling. After the concrete has been cast the forms are removed and the fabric is easily peeled from the concrete, leaving a smooth surface.—*The U.S. Rubber Co., Akron, Ohio.*

Welding Electrode

A new electrode designed specifically for all-position welding of mild steel with A-C type welding machines has been developed by Air Reduction Sales Co. Made to fill a rapidly growing need for a high quality A-C electrode for all-position use, the Airco No. 230 electrode complies with all requirements of the American Welding Society Classification E6011, American Bureau of Shipping, Group H1G and B1G for A-C and other specifications qualifying it for use on war work.—*Air Reduction Sales Co.*

Digger

The Novo pavement and concrete breaker has a new attachment for speeding the digging of post holes for highway guard rails. A heavily reinforced pointed cylinder pouch placed on the end of the hammer in place of the breaking nose has been successfully used on various types of grades where guard rail posts are to be placed. On the average, only three blows of the hammer are required to put down the post hole with this punch, saving considerable time and labor on this operation. This accessory can be used on any of the Novo breakers in the field or furnished with a new outfit.—*Novo Engine Co., Lansing, Mich.*

All-spray nozzle

To meet the demands for a variable, all-spray nozzle without a straight stream, a new water spray nozzle, the "Alfcospray," has been introduced by American-LaFrance-Foamite Corp. From the shut-off position, a slight turn of the tip immediately gives a cone spray of 40 deg. Further slight rotation produces increasing cones up to full curtain of 150 deg., with reversal back to shut-off with-

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools. Get your EQUIPMENT-SAVER — FREE

see full page ad page 103

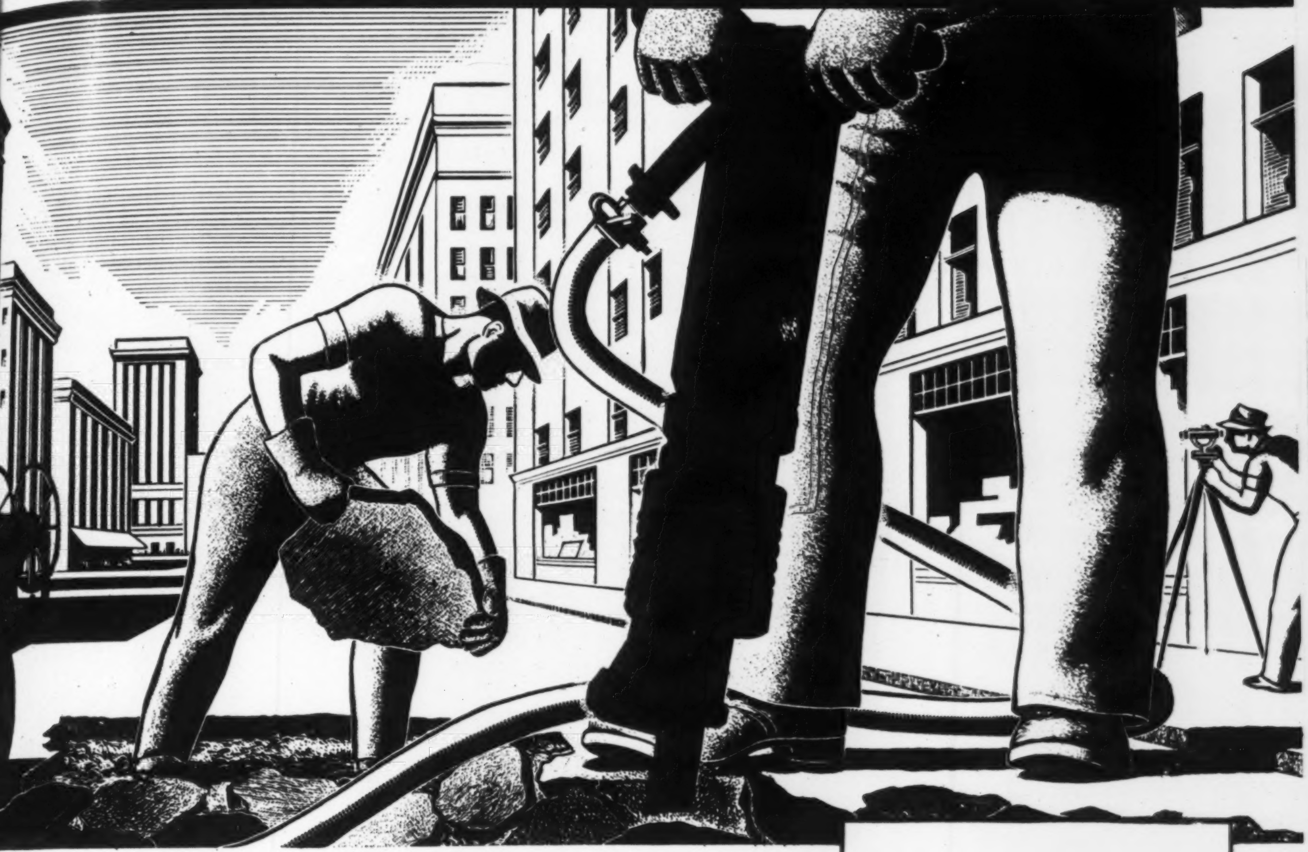
ALABAMA
  Birmingham — Ed Gantt Machinery Company
ARIZONA
  Phoenix — Smith Booth Usher Company
ARKANSAS—Fort Smith — R. A. Young & Son
  Little Rock — R. A. Young & Son
CALIFORNIA
  Los Angeles — Smith Booth Usher Company
COLORADO
  Boulder — Standard Machine Works
CONNECTICUT
  Hartford — The Holmes-Talcott Company
GEORGIA
  Atlanta — Tractor & Machinery Co., Inc.
ILLINOIS — Chicago— Kennedy-Cochran Co.
  Rock Island — Western Equipment & Supply Co.
INDIANA
  Indianapolis — Reid-Holcomb Company
IOWA — Des Moines — Electrical Eng. & Constr. Co.
KENTUCKY — Harlan — Hall Equipment Sales
  Louisville — Engineering Sales Company
LOUISIANA
  New Orleans —Wm. F. Surgi Equipment Company
MAINE — Ellsworth — Murray Machinery Co.
MARYLAND
  Baltimore — D. C. Elphinstone, Inc.
MASSACHUSETTS
  Boston — P. I. Perkins Company
  Cambridge — W. W. Field & Son, Inc.
  Springfield — The Holmes-Talcott Company
MICHIGAN
  Detroit — W. H. Anderson Company, Inc.
MINNESOTA
  Minneapolis — The George T. Ryan Company
MISSOURI
  Kansas City — Machinery & Supplies Company
  St. Louis — Webster & Hedgcock Tr. & Eq. Co.
MONTANA—Helena — Caird Engineering Works
NEBRASKA
  Lincoln — Highway Equipment & Supply Co.
NEW JERSEY
  Irvington — Smith Tractor & Equip. Co., Inc.
NEW MEXICO
  Albuquerque — The Harry Cornelius Company
NEW YORK
  Albany — Larkin Equipment Company
  Binghamton — MacDougall Equipment Co.
  Buffalo — Dow & Company, Inc.
  Corona, L. I. — The Jaeger-Lembo Machine Corp.
  Middleton — S. T. Randall, Inc.
  New York—Hubbard & Floyd, Inc.
  Olean — Freeborn Equipment Company
  Oneonta — L. P. Butts, Inc.
  Syracuse — Harrod Equipment Company
NORTH CAROLINA
  Durham — Constructors Supply Company, Inc.
OHIO — Cincinnati — The Finn Equipment Company
  Cleveland — Gibson-Stewart Company
  Marietta — Northwest Supply & Equipment Co.
  Toledo — M. W. Kilcorse & Company
OKLAHOMA
  Oklahoma City — Townsco Equipment Co.
OREGON
  Portland — Andrews Equipment Service
PENNSYLVANIA
  Easton — Sears & Bowers
  Harrisburg — N. A. Coulter
  Oil City — Freeborn Equipment Company
  Philadelphia — Metalweld, Inc.
  Pittsburgh — John McC. Latimer Company
  Wilkes-Barre — Ensminger & Company
SOUTH CAROLINA
  Columbia — Bell-Lott Road Machinery Co.
SOUTH DAKOTA
  Sioux Falls — Empire Equipment Co.
TENNESSEE
  Chattanooga — James Supply Company
  Knoxville—Wilson-Weesner-Wilkinson Co.
  Memphis — Tri-State Equipment Company
TEXAS — Dallas — Shaw Equipment Company
  Houston — McCall Tractor & Equipment Co.
  San Antonio — Patten Machinery Company
VIRGINIA
  Richmond — Highway Machinery & Supply Co.
WASHINGTON
  Seattle — Star Machinery Company
WEST VIRGINIA
  Fairmont — Interstate Engineers & Constructors
WISCONSIN
  Eau Claire — Bradford Machinery Company
  Green Bay — Nelson Machinery Company
  Madison — Western Equipment Company
WYOMING
  Cheyenne — Wilson Equipment & Supply Co.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Worthington Pump and Machinery Corp.

TIGER AT YOUR FINGER-TIPS



Get hold of this 80-pound Blue Brute, for fast, hard-hitting, clean-clawed destruction! Watch it rip *your* breaking or demolition time in half!

For this Worthington WB-80 delivers half again as many blows per minute as the ordinary paving breaker. Yet you'll find it's got amazing ease of operation for its size and power. It's a "Tiger" — but easy to control and even easier to handle!

All Worthington Blue Brutes are made to save you time and money on today's tough budget-busting jobs where every second, every dollar, counts. Worthington rock drills and air tools *use* less air, need less repair. Rugged Worthington Compressors . . . portable and semi-portable, gasoline-driven, diesel, electric . . . *deliver* more air, through famous Feather* Valves more smoothly, more economically. Try 'em out now, on your present job! Start today to get more *worth* from air, with Worthington!

FREE CONSERVATION AID

Metals scarce? Tools and parts hard to get? Ask your nearest Worthington distributor, listed on page 102, for the free EQUIPMENT-SAVER, a guide to compressor and tool-conservation, divided into sections ready to post on the job. If your distributor is not listed, write to Holyoke for your copy today.

On the Job with

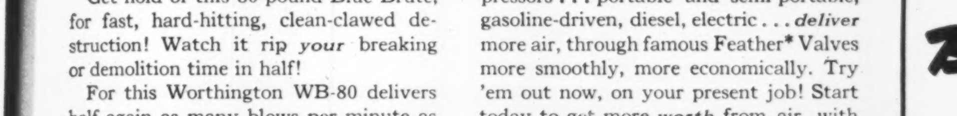
BLUE BRUTES

On a street car track removal job in the East, the Yankee foreman said, "We didn't waste any time or money on our Blue Brutes digging out this scrap to beat the Axis!"

* Reg. U. S. Pat. Off.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

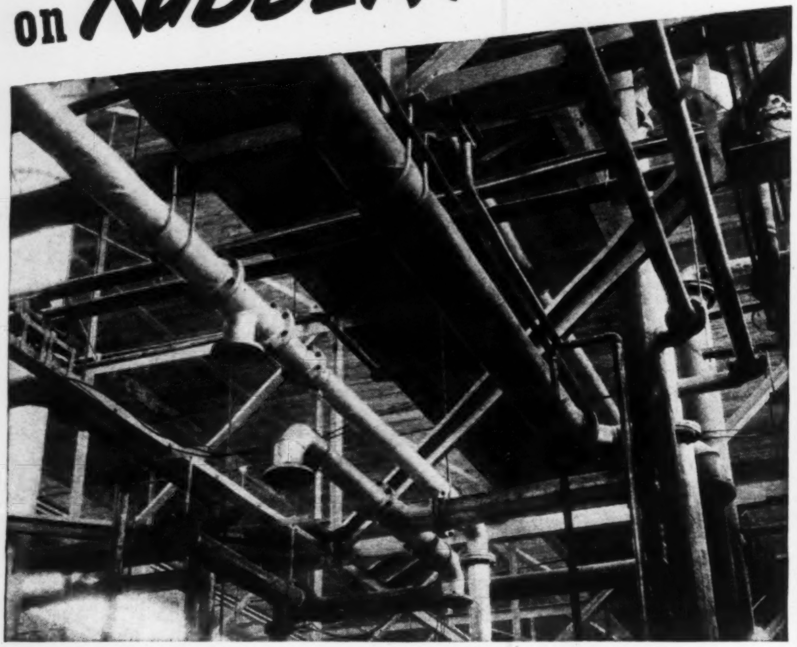


Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts

Timely aid for engineers working on RUBBER PLANTS



Synthetic rubber production can be accelerated with the aid of ARMCO Spiral Welded Steel Pipe. Use this pipe in vital plant construction for water supply lines, process piping and prefabricated fittings. You'll get a first-class piping job and important savings of time, labor and metal.

By designing to meet your needs *exactly* you save precious metal for the war effort. Just specify the one right size in any diameter from 6 to 36 inches. Wall thicknesses range from 9/64 to 1/2-inch.

Other advantages include uniform lengths up to fifty feet. This means fewer joints to assemble—fewer sections to unload, haul and string. For plant piping you can get standard or special fittings that come welded to straight pipe runs. A pair of flanges is eliminated at every bend, weight reduced and hours of tedious assembly saved.

Also consider ARMCO Spiral Welded Piles for fast, accurate foundation work. You'll like them for their strength and straight driving with the least time and effort.

ARMCO "Spiral Welded" has proved its time-and-money-saving qualities in synthetic rubber plants now building. Use it to help speed your construction work. Write for Bulletin 340—"6 to 36" Pipe For Industrial Uses"—also quotations and shipping promises. The American Rolling Mill Co., Pipe Sales Division, 3181 Curtis Street, Middletown, Ohio. Offices in principal cities.

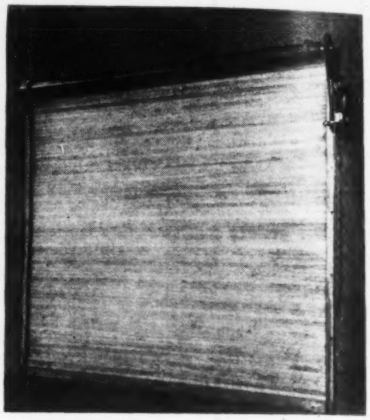
ARMCO

ARMCO SPIRAL WELDED PIPE

all-spray nozzle without a straight stream. This model finds favor with many public utility companies, as it prevents any possibility of a solid water stream being applied inadvertently on [illegible] electric circuits. — *American-LaFrance-Foamite Corp., Elmira, N. Y.*

Wood Rolling Door

The Kinnear Manufacturing Co. has announced production of an upward-acting, wood-rolling door providing a much needed answer for war-time door requirements, and offering a type of door operation preferred for many openings. By incorporating the same upward operating principle used for many years in the Kinnear steel rolling door, this product is reported to afford many of the same advantages as the steel door, plus long years of service. The curtain proper is composed of wood slots suitably shaped to permit easy articulation, and jointed together by means of metal tapes or cables. It coils overhead upon a barrel, journaled in heavy cast iron brackets mounted at the corners of the opening above the lintel, and travels in heavily constructed wood guides placed at the side of the opening. Bearings are provided at the points where the curtain enters the guides. Depending on the size of the door or on the owner's preference, operation can be manual, by chain and reduction gearing, or by motor.—*Kinnear Mfg. Co., Columbus, Ohio.*



Small tractor

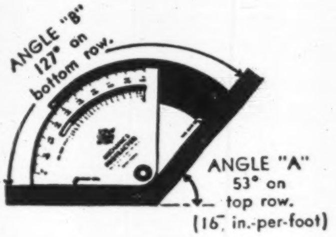
A tractor weighing only 3,400 lb. that can cut trails in rough forest regions, has been designed by the U. S. Forest Service. Although primarily for opening narrow truck roads in the Pacific Northwest for forest fire control, an "educational" order for 20 of the machines has been placed by the U. S. Army Air Corps. It is obvious that the tractor could be carried by a bomber to remote airfields where it would be extremely useful in smoothing out bombed runways.

The tractor is 37 in. wide, has an overall length of 6 ft. (with bulldozer in front and a hoist at the rear, the length is 10 ft. and the weight 4,200 lb.). The 30-hp. motor develops a 5,000-lb. pull in first gear. There are four speeds forward and four reverse; top speed 8.55 mph. It is said to be able to climb grades exceeding 20 percent. The motor is cantilevered forward, like a Tournapull, and the chassis is close coupled.

On roadways cut by this tractor a companion truck unit of the same width is designed to transport supplies which it is said to do at a cost one-tenth the average for transportation by pack animals.—*Clark Trucktractor Co., Battle Creek, Mich.*

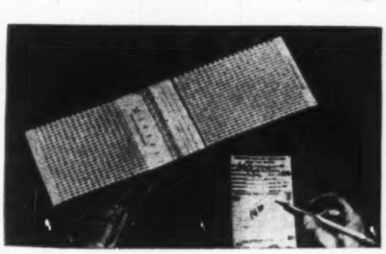
Protractor

A protractor especially designed for the man on the job has been made available by the Interstate Sales Co. Said to be the only instrument that offers a practical solution to angle measuring problems on the job, the instrument is said to have three exclusive advantages in that it gives readings for outside angles; gives readings for inside angles, and gives inches per foot against degrees. In addition, the manufacturer claims that difficult angles can be measured with the protractor in conjunction with a bevel and calibrations at the extreme of the radius enable accurate, clear readings to a fraction of a degree.—*Interstate Sales Co., 1123 Broadway, New York, N. Y.*


ANGLE "B" 127° on bottom row.
ANGLE "A" 53° on top row. (16 in.-per-foot)

Calculator

Payrolls and job costs can be figured in a fraction of the usual time through the use of a new calculator, according



Notable Advance in Tracing Technique

HI-DENSITY LINE

HI-DENSITY LEADS, even in the 4H and harder degrees, produce uniformly opaque lines. When blueprinted, at today's high speeds, they are still sharply white and clear. In continued use **MICROTOMIC "VAN DYKE"** pencils effect an improvement in tracing technique which becomes more and more apparent. The special quality of the **MICROTOMIC** leads—their **HI-DENSITY**—produces opacity without thickness of lead deposit. Much less tendency to smudging . . . Easier to erase . . . And, as every experienced draftsman knows, **MICROTOMIC "VAN DYKE"** Drawing Pencils are "tops", too, when measured by the perfection of their grading. Absolute in uniformity. Nothing finer made.

MICROTOMIC

DRAWING PENCILS

HI-DENSITY LEAD in the **MICROTOMIC "VAN DYKE"** Drawing Pencils, claims intense drafting room interest because it offers:

1 A More Opaque Line
2 Easier Erasures
3 Less Smudging
4 Absolute Uniformity of Grading

TRY THIS UP-TO-THE-MINUTE MEANS OF LIGHTENING THE LOAD FOR THE MAN AT THE BOARD . . . FREE

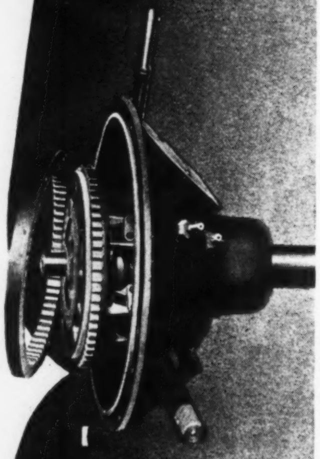
EBERHARD FABER PENCIL CO.
37 Greenpoint Ave., Brooklyn, N.Y.

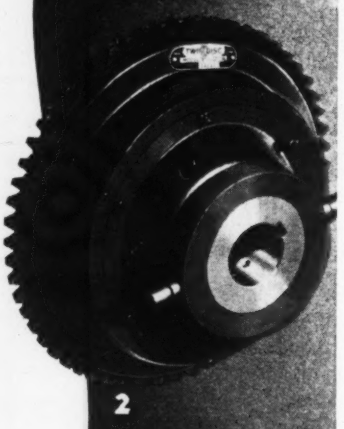
I'd like to test your MICROTOMIC VAN DYKE with the Hi-Density lead. Please send one as indicated below:
......degree, round lead (choice of 18 degrees)
or......degree, chisel shaped lead (6H, 4H, 2H, HB, 2B, or 4B)

NAME
NAME OF COMPANY TITLE
STREET AND NUMBER
CITY AND STATE

THE EBERHARD FABER DRAWING PENCIL WITH THE MICROTOMIC LEAD 18 DEGREES ... AND 6 DEGREES WITH CHISEL POINT LEADS

Here's some Time we saved for you years ago!





● Sounds like a far-fetched thing to say to an engineer or contractor, doesn't it? But we mean it literally—and here's why.

At last count, there were about seventy-one leading road building and material handling machinery manufacturers using Twin Disc heavy duty clutches as standard equipment. This predominance of Twin Disc Clutches did not come about accidentally. It resulted from the early demonstrated ability of Twin Disc Clutches to take the terrific beating which the men and machines doing America's road building must ofttimes endure. And from the operators' liking for its efficient, positive action; its ease of operation and adjustment; its long, trouble-free wear-life.

This widespread acceptance made possible the establishment of seven factory branches and thirty parts stations which are now ready to furnish you with parts and expert service quickly. So there's no time consuming delay when unavoidable repairs or replacements must be made.

That's why we say—"Here's some time we saved for you years ago." Because it was years ago, twenty-four to be exact, that the Twin Disc Clutch Company began supplying industrial clutches "Built to Fit the Job"—and they've been doing the job ever since.

1. *Twin Disc Power Take-off for engines having up to 285 hp. output. Sizes: with single plate clutches, 6½" to 24"; double plate, 11½" to 18". Housing sizes: No. 6 S.A.E. to No. 00 S.A.E.*

2. *Twin Disc Model E Clutches, heavy-duty, enclosed type. Sizes: 14" to 42" in single or two-plate assemblies.*

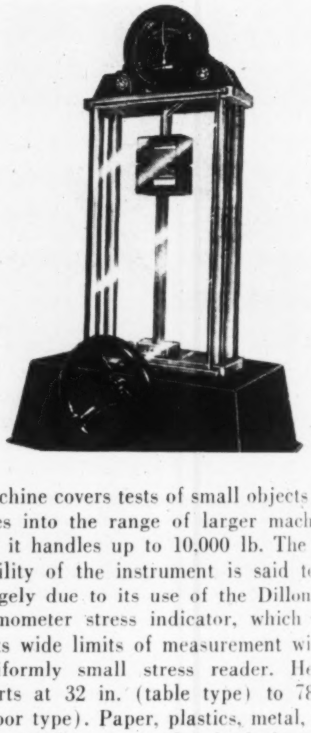
TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

TWIN DISC CLUTCH COMPANY • RACINE, WISCONSIN

to the manufacturers, the Berger-Bricker Co. Operating on a simple new principle, this device includes all hourly rates of pay from $0.50 to $1[illegible] with a half-cent spread between the rates. It covers all time periods up to 24 hours, with divisions of one-tenth of an hour. Handsomely made of lacquered wood, it easily fits into a desk drawer.—*Berger-Bricker Co., 433 So. Spring St., Los Angeles, Calif.*

Tensile Testers

Engineers of the W. C. Dillon Co. have broadened the scope and utility of stress testing of materials, by virtue of features incorporated into a new table and floor model portable unit. This expansion of usability is noticeable in a table model, an "in-between-size" instrument, able to physically check specimens up to a foot in length, and 9 in. width. In short, the machine covers tests of small objects and goes into the range of larger machines for it handles up to 10,000 lb. The versatility of the instrument is said to be largely due to its use of the Dillon dynamometer stress indicator, which permits wide limits of measurement with a uniformly small stress reader. Height starts at 32 in. (table type) to 78 in. (floor type). Paper, plastics, metal, rubber, wood, etc., may be checked readily for elasticity, so long as their breaking point lies between zero and 15,000 lb. as a number of capacities are now available in this range.—*W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago, Ill.*

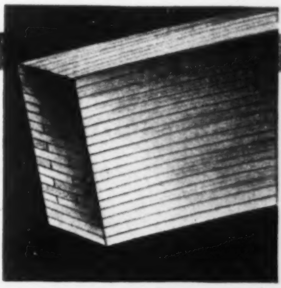


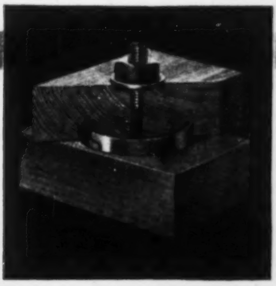
Hacksaw Frame

A cam-action, lever-lock that sets up and releases the blade is a feature of a new type of hacksaw frame manufactured by Clemson Bros., Inc. Loose blade studs and threaded tension devices have been completely eliminated with the result that blades can be replaced or repositioned in a fraction of the time

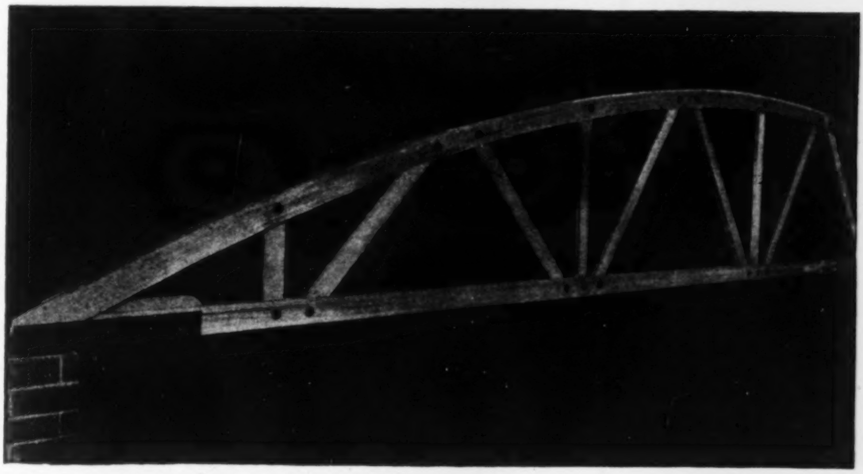
Design the Job for TIMBER FRAMING

Now, Glued Lamination and Teco Connectors give you beams, arches and roof trusses of light weight and great strength for wide post-free spans!



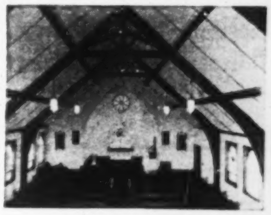


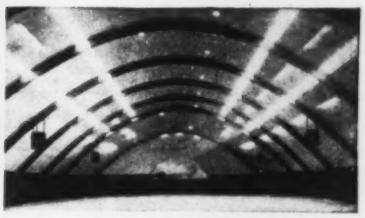
Architects and engineers are proceeding with essential war-time construction by using wood structural framing members. For great hangars and military chapels, for ship and airplane factories, for almost any type of structure, lumber is being engineered and shaped, formed and joined to meet a wide range of specific structural needs.



The Teco connector system of wood construction makes possible standard timber trusses for spans up to 100′ or more, using no timber heavier than 3 x 12. Such trusses can be factory fabricated and often delivered to the job site assembled for ready erection—or the prefabricated members can be delivered knocked-down, ready for assembly.

Glued laminated structural members are available in a variety of sizes, types and shapes. Beam arches for spans up to 200 feet or more—ply beams for flat roof structures of one and two stories—bowstring trusses, boomerang and utility arches and arch rafters can be designed and factory fabricated for the job you are now planning, regardless of its size or location.





It is easy to design the job for wood structural framing members. Complete data is available. Skilled fabricators are making standard timber trusses and glued laminated structural members to exacting specifications, which meet Army, Navy and Building Code requirements—shipping them to the job for speedy erection. Their engineering staffs are ready to cooperate with you . . . Write today for information. Copyright 1942, Weyerhaeuser Sales Company

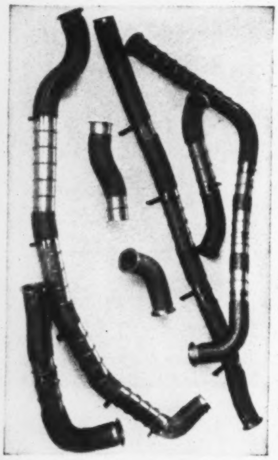
WEYERHAEUSER SALES CO.
First National Bank Building • Saint Paul, Minnesota

In War Time, It's . . .

FLEXPEDITE

★ Achieve design flexibility, conserve vital materials, speed conversion, assembly and production by utilizing flexible metal connections—specifically..

REX *Flexible* METAL HOSE



Units Shown are Typical Vari-formed Assemblies.

The many production types of REX Flexible Metal Hose offer the widest range of adaptability—for simplifying re-design problems where space limitations and flexibility are imperative—for conserving more critical materials—for solving every kind of fluid and gas handling problem.

REX Flexible Metal Hose speeds manufacture by facilitating assembly. It can be bent to position or "snaked" into place and coupled in a fraction of the time required to fit multi-plane pipe connection. Easily attached fittings for every requirement. REX Flexible Metal Hose withstands severe flexing and vibration. All in the interest of war time economy.

FLEXPEDITE *YOUR* PRODUCTION

Write for data and engineering recommendations on specific problems involving flexible connections.

REX-WELD Corrugated Flexible Metal Hose • REX-TUBE Interlocked Flexible Metal Hose
REX-FLEX Stainless Steel Flexible Tubing • AVIOFLEX Oil Line Hose • CELLU-LINED Hydraulic Hose

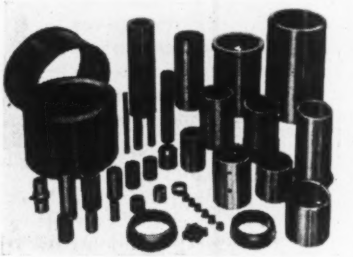
Copyright, 1942, Chicago Metal Hose Corporation, Maywood, Illinois

CHICAGO METAL HOSE CORPORATION
General Offices: MAYWOOD, ILLINOIS
Factories: Maywood and Elgin, Ill.

required with frames of conventional design, the manufacturer claims. Straighter cuts and reduced blade breakage result from the extremely high tension which this new strong frame puts on the blade. This high tension is possible because the frame is made of heat treated spring steel, making it the most rigid adjustable frame manufactured. The frame may be adjusted for 8 in., 10 in. or 12 in. blades, by pulling out a single pivot pin to its open position, sliding frame forearm in or out to desired length, and snapping pin back into place.—*Clemson Bros., Inc., Middletown, N. Y.*

Molded Fabric Bearings

Shortages of critical bearing metals are being overcome and performance results said to be greatly improved through the use of oil-lubricated nonmetallic molded bearings, developed by the Gatke Corp. Known as Lubritex bearings, these bearings are distinctly different from Gatke Hydrotex (water lubricated) and Gatke Grafitex (self lubricated) bearings in that they are made of various material combinations developed especially to meet all kinds of service conditions, using grease or oil lubrication. According to the manufacturer, Lubritex bearings are replacing conventional bearings with highly satisfactory results on all kinds of service. They stand up under impact loads that are too great for metal bearings—have much greater wear life and lower friction. They are engineered for the application and molded to finished dimensions in all shapes and sizes for replacing metal bearings. —*The Gatke Corp., 228 N. LaSalle St., Chicago, Ill.*



From FARM to FACTORY in 90 days with the help of Pressure-Treated Wood

If your problem is to RUSH construction jobs—*and still do them right*—you'll find the answer in records like this.

A manufacturer of vital war materials needed a new plant building "yesterday."

Ninety days from the time ground was broken on the farm-land site, production machinery was being moved into the new factory. The delivery lag alone on other construction materials might easily have equaled or exceeded this complete construction time.

The progress picture above shows the structural members which were pressure-treated not only for protection against termites and decay, but for fire-protection. The load-carrying capacity of wood members is reduced by fire at a much lower rate than that of steel of equal initial strength. Pressure treatment for fire resistance protects timber against spread of flame and generation of smoke, and so adds a highly important safety-factor.

While War has stimulated the use of pressure-treated wood for construction jobs, it did not pioneer it. For many years cost-conscious engineers have been using pressure-treated wood as first choice for all sorts of permanent structures, at a saving in time, in material cost, in erection costs and in maintenance. If you have any buildings, bridges, tanks, or similar projects in hand right now, you can make similar savings. We will be glad to discuss possibilities with you if you care to write.

KOPPERS COMPANY
WOOD PRESERVING DIVISION
PITTSBURGH • PENNSYLVANIA

se **KOPPERS** *products*

Free Bulletin

HOW TO
MAKE YOUR
CONSTRUCTION
TIRES LAST
LONGER

Contractors, servicemen, mechanics and operators looking for ways to make construction equipment tires last longer will get plenty of tire-saving information from this helpful bulletin, "Stretch Your Tires." It's prepared specially for you, gives you factual dope on:

Recommended tire pressures over a full range of working conditions for all LeTourneau Carryall Scrapers (current and older models), Cranes, Tournapulls, Tournatrailers and Tournacranes . . . Tire-conserving operating hints . . . Proper tire upkeep and repair . . . Haul road maintenance . . . Recommended tire tools, accessories, etc.

Unfolds to 15" x 19" so tire pressure chart can be posted for ready reference. Write NOW for your free copy, or for as many copies as you will need. It will pay you in the long run by keeping your tires and equipment rolling longer for Victory!

LETOURNEAU
PEORIA, ILLINOIS
STOCKTON, CALIFORNIA

Send This Coupon TODAY

Gentlemen:—

Please send me FREE ...... copies of "Stretch Your Tires."

Name ....
Position ....
Company ....
Address ....
City .... **State**..........

Manufacturer's Activities

Personnel changes and new plans

Marking its appreciation of the excellent production record established in building trucks, the Army-Navy "E" Award was presented recently to the FEDERAL MOTOR TRUCK CO. at Detroit. T. R. LIPPARD, president of the company, accepted the pennant on behalf of the company and in an address pointed out that the company has been entrusted with the task of turning out some of the largest trucks ever used by the armed services. Four distinctive types of heavy trucks for a variety of uses are produced.

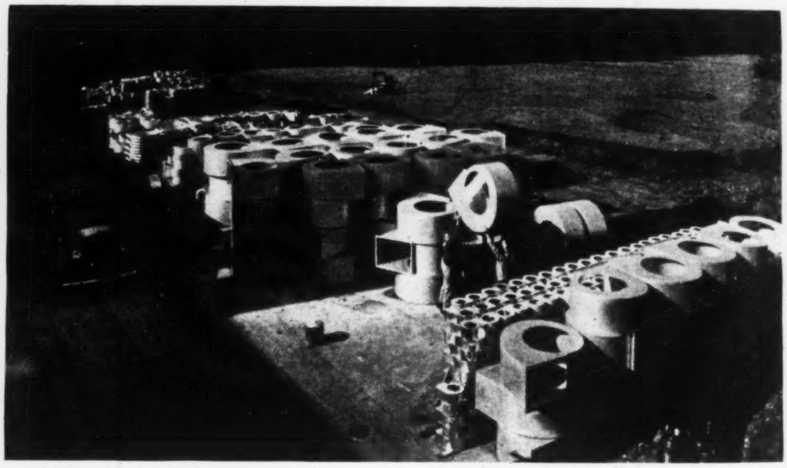
DANIEL A. MURRAY, 49, until recently controller of the A. O. SMITH CORP., Milwaukee, Wis., died recently.

MERRITT L. SMITH, advertising manager of METAL AND THERMIT CORP., has been appointed assistant sales manager of the corporation. He will continue to direct the company's advertising activities.

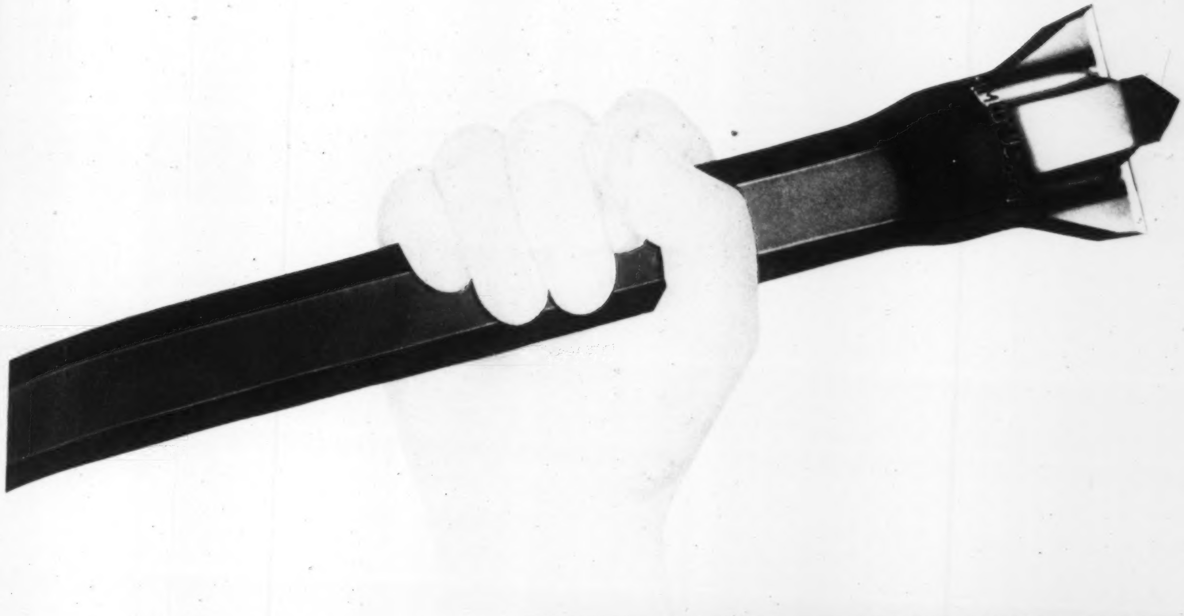
H. P. BINDER, formerly assistant manager of the hydraulic department of ALLIS-CHALMERS MANUFACTURING CO., has been made manager of the centrifugal pump department.

A unique industrial refresher course designed to increase efficiency in the handling of wrought iron has been offered by the A. M. BYERS CO. of Pittsburgh. The course, consisting of easy-to-read charts and instructive booklets, is designed for use by pipe fitters, plumbers, welders, and all other metal workers. It is also available for students in apprentice or "up-grading" training courses.

WALTER M. WEIL, president of the NATIONAL SMELTING CO. was on hand recently at the inauguration of a new idea for bringing home to war plant workers a sense of their immediate responsibility to the nation in the war effort. In a formal ceremony of self-dedication, witnessed by 1,200 employees and guests, labor and management representatives enrolled themselves as "Production



The ILG ELECTRIC VENTILATING CO. of Chicago, Ill., faced with the necessity for obtaining additional war production space without using critical materials for building a plant addition, solved the problem by constructing an open air concrete storage space immediately adjacent to the present Ilg plant. As shown in the above photo, the area west of the factory building, long used as a miniature golf course for employees, was partially converted to a storage area. 12,000 sq.ft. were taken from one end of the course, leveled off and given a concrete base which was in turn connected to the main plant by concrete runways. In the storage area created, galvanized parts and blowers destined for navy and maritime commission ships are stored until ready for assembly or shipment. Space within the plant which ordinarily would have been used for storage purposes has been filled with new machinery to further speed production.



the tool
THAT KEEPS BOTTLENECKS OPEN

MAN POWER: If your production is handicapped by a labor shortage, start using Timken Rock Bits. Timken Bits reduce the number of blacksmiths and nippers needed. Men released from the forge and from transporting steels are thereby made available for other work. Timken Bits reduce congestion at the drilling face. Less congestion, more constant drilling and fewer accident—time—losses.

MACHINERY: Transportation facilities, often the limiting factors in the quantity of "down material" that it pays to shoot, are relieved of carrying enormous quantities of drill steel when Timken Bits are on the job. The fast drilling assured by Timken Bits results in greater footage per hour of drilling equipment service—from compressors to drills.

While production costs are less important today than in years, you can enjoy the above advantages without the penalty of increased expense.

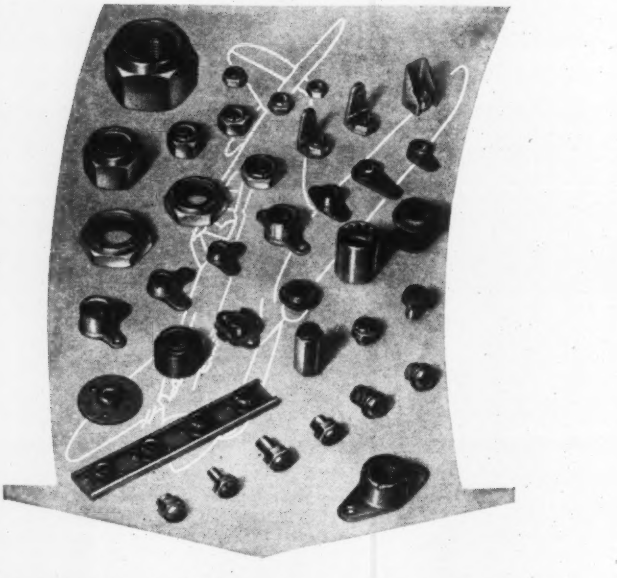
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

The size of the Timken Bit belies its results in increasing production. The same can be said for its cost cutting advantages which will be as important in after Victory competition as is war production today.

HELP ASSURE VICTORY
Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel. Use the Telephone Only When Important. Salvage All Scrap and Waste Material.



FASTENINGS YOU CAN TRUST

1. Application is fast and fool-proof...
Their locking action is immediate and automatic . . . no pins, no washers, nothing to forget.

2. Grip is positive, yet resilient...
Threads of nut and bolt are held in contact under constant cushioned pressure. The nuts stay put.

3. The locking element does not fail...
Made of non-metallic, non-fatiguing material, it cannot be broken down by vibration or prolonged hard service.

There are more Elastic Stop Nuts on America's airplanes, tanks, guns, Naval vessels, and production equipment, than all other lock nuts combined.

» Write for folder explaining the Elastic Stop self-locking principle

ELASTIC STOP NUT CORPORATION • 2331 VAUXHALL ROAD • UNION, NEW JERSEY

Elastic Stop SELF-LOCKING NUTS
REG U.S. PAT OFF
AND AIRCRAFT FITTINGS

WITH THE RED LOCKING COLLAR . . . SYMBOL OF SECURITY

FASTER • BETTER • STRONGER

HYDRO-TITE FOR BELL & SPIGOT PIPE JOINTING

Hydro-Tite is a dependable self-caulking sulphur-base compound for jointing water mains and soil pipe—costing less than lead—requiring no skill to make tight joints. Same crew can lay more pipe per day. Stands deflection and vibration. In use 30 years without failure.

Write for Jointing Book.

HYDRAULIC DEVELOPMENT CORP.
50 CHURCH STREET — NEW YORK, N. Y.

Soldiers" by swearing an oath pledging their "hearts and hands to the country's cause on the battle line of war production."

Production of propulsion equipment for naval vessels and turbines for land power houses at the WESTINGHOUSE Steam division, South Philadelphia, Pa., has more than doubled in the last ten months as compared with the ten months preceding Pearl Harbor, according to A. W. ROBERTSON, chairman of the board of directors.

JOHN RINGLE, JR., president of the Northern Chief Iron Co. and secretary-treasurer of the Ringle Brick Co., of Wausau, Wis., died recently at Glendale, Calif.

THOMAS H. CORPE has been named general sales manager of the ELASTIC STOP NUT CORP. Mr. Corpe was formerly assistant general sales manager of the Lockheed Aircraft Corp., and at one time was in charge of sales promotion, advertising and market research for that company.

The UNION STEEL CASTINGS DIVISION of the BLAW-KNOX CO. recently was awarded the joint Army-Navy "E" flag in recognition of its outstanding service to the war effort. D. V. SHERLOCK, vice president of the company and general manager of the Division, received the flag on behalf of employees and the management.

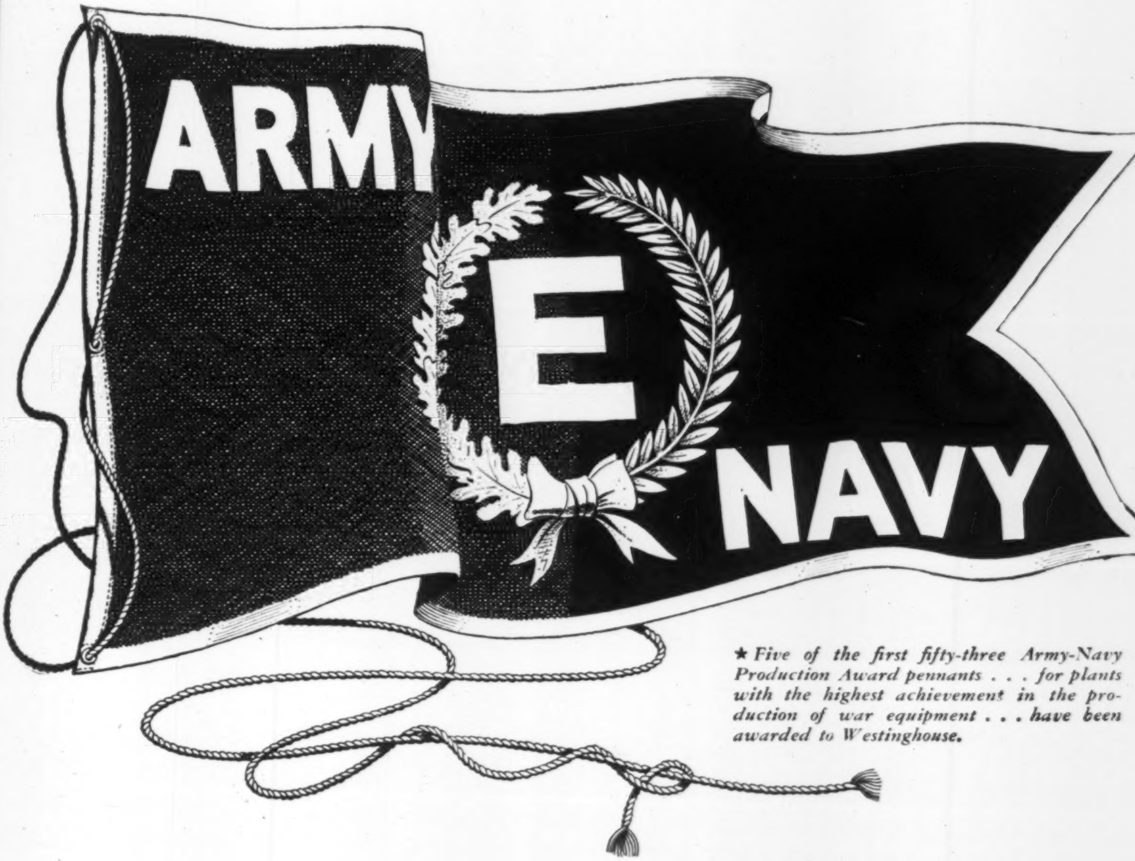
W. H. MILTON, JR., manager of the GENERAL ELECTRIC CO.'s plastic department, Pittsfield, Mass., has announced that A. C. TREECE, head of the Chicago sales office has been transferred to Pittsfield, and T. E. GIBLIN, formerly of the Pittsfield branch, has been transferred to the Chicago sales office.

H. KEIM, vice president in charge of operations on the Pacific Coast for OIL WELL SUPPLY CO.—a subsidiary of U. S. STEEL CORP., has been transferred to the company's manufacturing headquarters at Oil City, Pa.

FRANK R. PHILLIPS, 66, chairman of the board of the PHILADELPHIA CO., Pittsburgh, Pa., utility, died recently.

STANLEY W. HARRIS, 65, president of the MCNEIL MACHINE & ENGINEERING CO. of Akron, Ohio, died at Monroe Falls, Ohio, recently.

ROBERT LEE BLAFFER, 66, who retired a



★ *Five of the first fifty-three Army-Navy Production Award pennants . . . for plants with the highest achievement in the production of war equipment . . . have been awarded to Westinghouse.*

To Westinghouse men and women, for "an outstanding contribution to victory"

IN ANNOUNCING that five of the first fifty-three Army-Navy Production Awards go to Westinghouse, James Forrestal, Undersecretary of the Navy, said, "The men and women in these plants are making an outstanding contribution to victory. Their practical patriotism stands as an example to all Americans and they have reason to be proud of the record they have set."

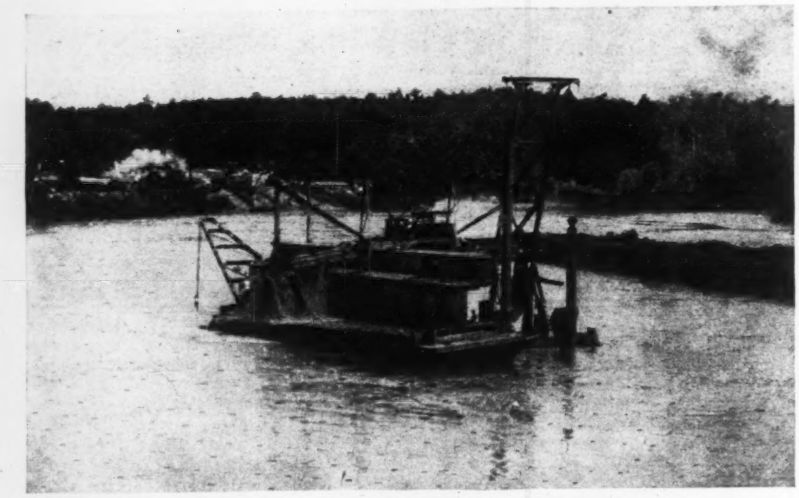
Westinghouse, one of the world's leading manufacturers of electrical equipment, is now producing war materials at the rate of 4000 carloads per month . . . enough to fill a freight train *37 miles long every 30 days.*

To this effort, we are applying the full extent of Westinghouse "know how" in scientific research, in engineering, and in production. As a result, production, on a man-hour basis, is 95% ahead of the mid-1940 rate. In some divisions, production is up more than 300%.

This is the record to date. We hope to make it still better tomorrow.

Westinghouse

Westinghouse Electric and Manufacturing Company,
Pittsburgh, Pa. • Plants in 25 cities—Offices everywhere



EXPECTED PRODUCTION . . .

180 Cu. Yd. per Hour

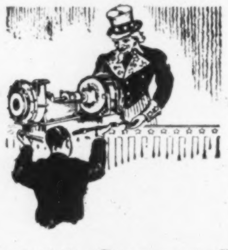
ACTUAL PRODUCTION . . .

345 Cu. Yd. per Hour

Almost twice the anticipated production of sand and gravel . . . accomplished by this Morris Hydraulic Dredge. It's just an old Morris custom to surprise . . . pleasantly . . . the purchasers of Morris equipment. The excess capacity is not always as great as in this case, but Morris stands squarely back of all guarantees, and Morris Dredges have established a record of doing better than promised.

On operating and maintenance costs, too, Morris Hydraulic Dredges make gratifying records. The high efficiencies of Morris Dredging Pumps result in low power consumption, and their sturdy construction with tough, wear-resistant metals assure handling extremely large quantities of sharp sand and abrasive gravel before replacements become necessary.

WE HAVE ENLISTED



"FOR THE DURATION"

We have placed at the disposal of the Government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

MORRIS MACHINE
WORKS

MORRIS
ESTABLISHED 1864

BALDWINSVILLE
NEW YORK

CENTRIFUGAL PUMPS

year ago as chairman of the board of HUMBLE OIL & REFINING Co., died recently in Toronto, Canada, where he had been visiting members of his family.

WILLIAM J. SIMPSON, formerly an engineer for the BALDWIN LOCOMOTIVE WORKS, the BALDWIN-SOUTHWARK CORP., and the BRILL CAR CO., has joined the engineering staff of MILTON ROY PUMPS, Philadelphia, Pa.

L. M. TAYLOR, an executive of the MISSISSIPPI POWER & LIGHT CO. at Jackson, Miss., has been named state chairman of the industrial salvage campaign for the War Production Board.

In the interests of industrial conservation, and to help speed war production, METALLIZING ENGINEERING CO., INC., is offering a total of $650 in war bonds for details of maintenance and salvage procedures with the metal spraying process. The contest closes Dec. 15.

Forty-four veteran employees, whose total service amounts to 1,100 years with the B. F. GOODRICH CO., have organized a Pacific Coast chapter of the company's 20-year club.

The appointment of CHARLES E. LEBERKNIGHT to head the newly created department of research of KOPP GLASS, INC., has been announced by C. H. Curry, president of the Swissvale, Pa. Corporation. Dr. Leberknight was formerly a member of the research department of the UNION SWITCH AND SIGNAL CO. at Pittsburgh. The research division will permit a more extensive study of the physical properties of glass and the possibilities for the further advancement of the science of glass making.

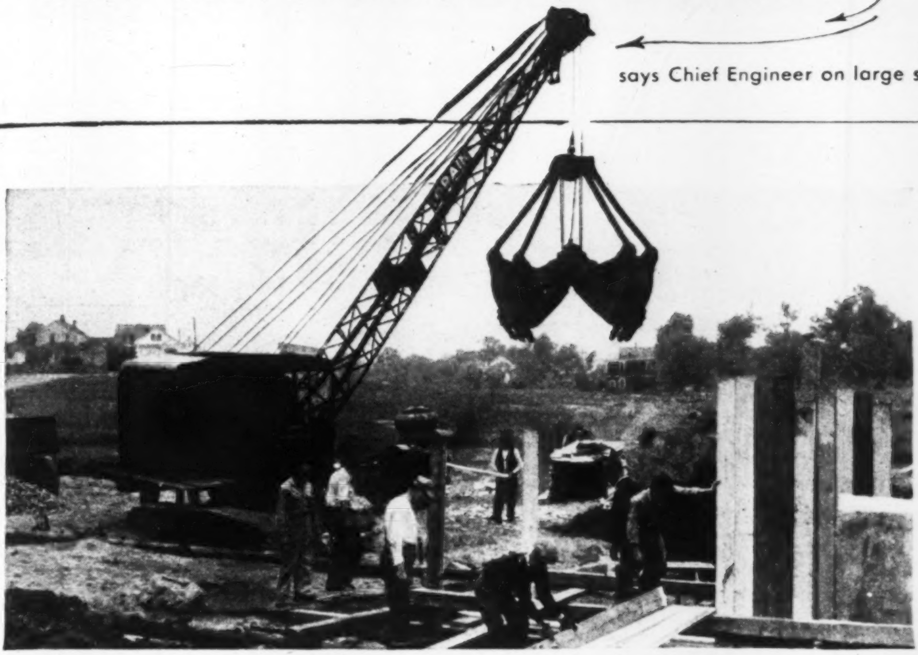
L. V. FOX CO., INC., Woodward Building, Washington, D. C., has recently taken over distribution of the new Micro-Scale manufactured by the LEONARD ENGINEERING CO. of Capitol View, Md.

The seventh and eighth awards of the Army-Navy "E" to plants owned or operated by the DUPONT CO. for outstanding accomplishment in production of war materials were made jointly recently to the local industrial and chemical warfare plant of the Electrochemicals Department at Niagara Falls, N. Y.

DAMON DEB. WACK, assistant to the president of the NATIONAL BEARING METALS CORP., has been elected executive

"We insure dependable operation of our equipment with Gulf Lubricants and Fuels,"

says Chief Engineer on large sewer job



"Laying 140 miles of pipe without interruptions requires proper lubrication and top-notch fuel performance—that's why we have standardized on Gulf products"

"THERE are enough headaches on a job of this kind without taking chances on lubrication and fuel performance," says the Chief Engineer of Cranston, Rhode Island. "So at the start of this job we standardized on Gulf products, which have helped us get efficient service from our equipment and avoid unnecessary operating delays."

You, too, will find it is *good insurance* to use Gulf products on your next job. Call in a Gulf service engineer today and ask him to recommend the proper type and grade of lubricants and fuels for each piece of equipment you employ. His recommendations are based on broad experience and knowledge gained through daily contacts in the field. And his one big aim is to help you get the best lubrication and fuel performance — which means a speedier, more profitable job.

The services of a Gulf engineer—and the Gulf line of quality lubricants and fuels—are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF OIL CORPORATION • GULF REFINING COMPANY • GULF BUILDING, PITTSBURGH, PA.

Cut Material Costs
Reduce Placing Time
Get Stronger Concrete
with Mall TRADE MARK
VIBRATORS

GASOLINE POWERED 3 H.P. UNIT

Equipped as a Concrete Surfacer

Placing A Stiff Mix Concrete

FOR VICTORY
BUY UNITED STATES WAR BONDS STAMPS

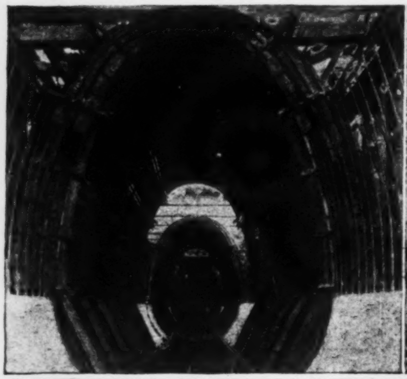
Operates 8 tools

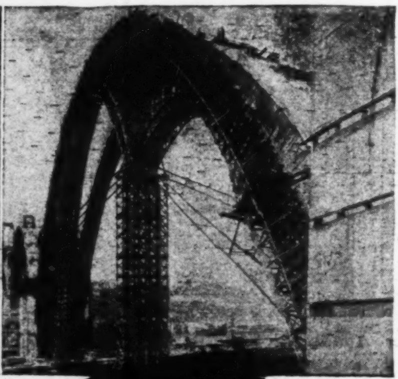
Concrete Vibrator, Concrete Surfacer, Form Sander, Wire Brush, Drill, Chain Saw, Circular Saw, Sump Pump

- Places low-water-cement-ratio concrete better, faster
- Eliminates honeycombs and voids
- Assures a stronger bond with reinforcement
- Permits an earlier stripping of forms
- Operates 1¾" x 20", 2⅜" x 12", or 3¼" x 12" Vibrators
- Variable speeds 1000 to 3000 r.p.m.
- Countershaft speeds 3000 to 7000 r.p.m.

Available on Priority Orders—write for literature and prices

MALL TOOL COMPANY
7730 SOUTH CHICAGO AVE. CHICAGO, ILLINOIS
Offices and Distributors in Principal Cities





for Speed in Construction

The rapid progress of engineering construction has naturally influenced the design of Blaw-Knox Steel Forms with respect to their general application and operation.

The engineering facilities and services extended by Blaw-Knox form engineers are prized by all who have taken advantage of them. These services are offered in the interest of engineering progress and are free from any charge or obligation.

BLAW-KNOX STEEL FORMS

BLAW-KNOX DIVISION
of Blaw-Knox Company
Farmer's Bank Bldg. Pittsburgh, Pa.
New York Chicago Philadelphia Birmingham

vice president of the company in active charge of all its plants.

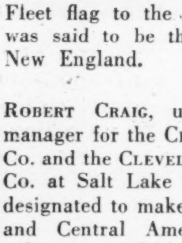
I. B. Babcock, president and general manager of the **Yellow Truck and Coach Mfg. Co.**, recently gathered employees in his office at Pontiac, Mich., to witness presentation of certificates of individual production merit awarded to three employees. Employees honored were **Carlton Jones**, **LeRoy Pyles** and **Martin L. Pearson**.

James B. Turpin, 62, manufacturers' agent for the **Midwest Steel Co.**, died recently at St. Louis, Mo.

Hersey & Co., Inc., of Seattle, Wash., has changed its name to **American Ventilating Hose Co.** as of Nov. 2.

Lawrence E. Skelly, who has been connected with **Young Radiator Co.** of Racine, Wis., for the past several years, has been commissioned a lieutenant (j.g.) in the U. S. Navy.

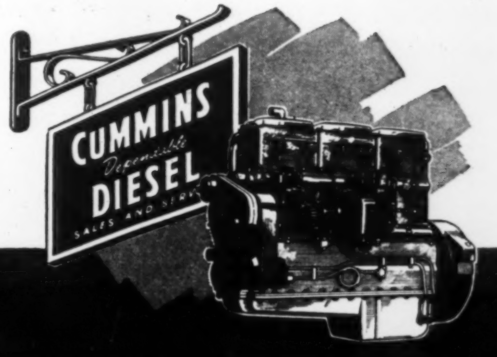
Keystone Carbon Co., St. Marys, Pa., has announced the appointment of **George B. Shaw** as sales engineer. Mr. Shaw is a graduate of St. Francis College and will devote his efforts to promotion of Keystone negative temperature coefficient resistance material.



Walfred Peterson, for 30 years an employee of the **Wickwire Spencer Steel Corp.**, at the company's Palmer plant, Palmer, Mass., was a flag honor guard at recent ceremonies celebrating the award of the Maritime "M" pennant and Victory Fleet flag to the company. The award was said to be the first "M" made in New England.

Robert Craig, until recently district manager for the **Cleveland Rock Drill Co.** and the **Cleveland Pneumatic Tool Co.** at Salt Lake City, Utah, has been designated to make a trip through South and Central America contacting distributors and looking after the interests of affiliated concerns.

R. H. Luebbe has been appointed assistant manager of General Electric Co.'s appliance and merchandise department. **Gerard Swope, Jr.**, counsel of the ap-



ARE YOU TAKING FULL ADVANTAGE OF THE SERVICES OFFERED BY YOUR *Cummins Dealer* ?

A CLEARING HOUSE FOR SERVICE HELPS

As a result of the war emergency, short-cuts and new ideas are being continually discovered by Cummins maintenance and service men throughout the country. Because your Cummins dealer is in constant touch, not only with the Cummins factory, but with a nation-wide dealer organization, he is a clearing house for the best practices on parts reclamation. He can show you how to get the maximum use out of every part.

TRAINING NEW MECHANICS

Are your new men thoroughly familiar with Cummins' program of preventive maintenance? Do they completely understand the best methods of servicing your engines? Your Cummins dealer will welcome the opportunity to work with your mechanics . . . make certain their information is up-to-date . . . keep it up-to-date with Service Bulletins and the latest Operator's Manuals. A complete maintenance and service training program is available for any mechanic unfamiliar with the care and operation of the Cummins Diesel. Talk to your dealer about it.

MAINTENANCE SERVICE

If you do not employ your own mechanics, your Cummins dealer offers you a complete maintenance service at a moderate cost. Discuss your problems with him.

REMEMBER THIS

The Cummins Customer Service Policy was built around your needs. Unnecessary duplication of parts stocks is avoided. This assures maximum parts stocks at one centrally located, and easily accessible point. Continuously working with the dealer organization are direct, factory sales and service representatives. This gives you an immediate factory contact, with no red tape . . . "owner-to-dealer-to-factory."

★ ★ ★

You owe it to yourself to know how we are insuring a better, "after-the-war" diesel . . . one which will do your job at a lower cost, over a longer period, with less maintenance and service. Ask your dealer for the new booklet, "Threshold to the Future" or write direct to the CUMMINS ENGINE COMPANY, *Columbus, Indiana.*

WHATEVER THE *MAIN* EVENT

BOMB-DAMAGED MAINS
FLOOD-DAMAGED MAINS
NEWLY-INSTALLED MAINS

THIS W&T CHLORINATION TRAILER IS

"Johnnie-on-the-spot"

When an emergency strikes—whatever the cause—it is vital that mains be restored to service as soon as possible free from contamination. Similarly, new main extensions require treatment before being opened to service. In any such event, the W&T Chlorination Trailer is *"Johnnie-on-the-spot"*. . . a real time-saver and possibly a life-saver too. It can be towed to the required location by any auto . . . and quickly hooked up to sterilize the main, or if necessary, the water supply flowing through it.

But emergeny service is only *part* of the job a W&T Chlorination Trailer can do. It will treat secondary chlorination needs away from the plant. It is built to take hard service. It has the wide range and accurate control of application rate made possible by the "visible vacuum" principle. SA-139-S

For full details, call or write your W&T representative.

"The Only Safe Water is a Sterilized Water"

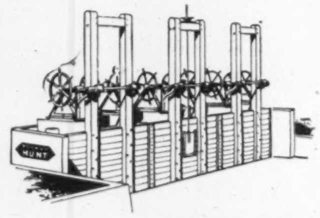
WALLACE & TIERNAN CO., Inc.

MANUFACTURERS OF CHLORINE AND AMMONIA CONTROL APPARATUS
NEWARK, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity-
★★ WRITE OR WIRE ★★

LA CROSSE TRAILER & EQUIP'T CO
LA CROSSE WISCONSIN U S A



Rodney Hunt SLUICE GATES

Are you interested in metal or timber sluice gates, hoists, stands or other water controlling apparatus? Rodney Hunt has over 100 years' experience making this type of equipment.

Write for special catalog today.

Water Controlling Apparatus Division
RODNEY HUNT MACHINE COMPANY
79 Lake Street Orange, Mass., U. S. A.

pliance and merchandise department, has been granted a leave of absence to enter service of the Navy department at Washington, D. C. As assistant manager, Mr. Luebbe will be responsible for all legal matters pertaining to the department, and will perform such administrative duties as may be assigned.

E. J. Hammerly, salesman in the Philadelphia district of the International Products Sales division of **B. F. Goodrich Co.**, has completed 30 years of service with his organization.

Doyle & Russell, Richmond, Va., contracting firm, has been awarded the joint army-navy production award for outstanding production in wartime construction. The award went to the company and its associated subcontractors for major additions and improvements to the naval operating base at Norfolk.

Allen P. Livar has been appointed chief engineer of the Airtemp Division, **Chrysler Corp.** Mr. Livar, who was division chief heating engineer since 1937, will take over the duties of R. G. Wyld, who recently accepted a commission as a lieutenant in the U. S. Navy.

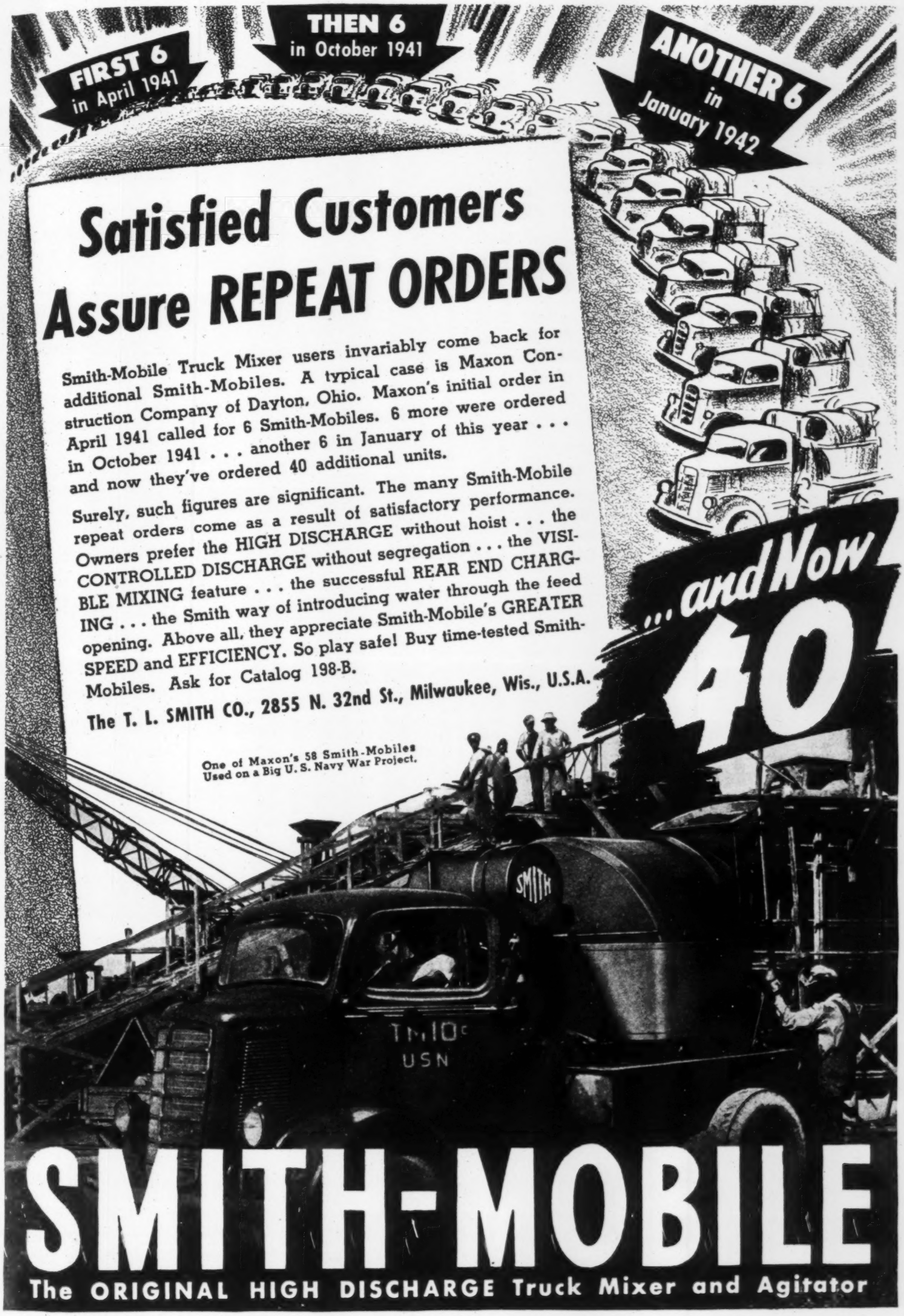
Harry W. Renick has been appointed a vice president of the Brake Shoe and Castings division of the **American Brake Shoe & Foundry Co.** The appointment is in addition to Mr. Renick's present duties as vice president of Brake Shoe's Ramapo Ajax division.

R. O. Lewis, who opened the **Wheeling Steel Corp.**'s plant on West Mallory in Memphis, Tenn., about 15 years ago, died at Portsmouth, Ohio, of a heart attack recently. He was transferred to Portsmouth eight years ago after retiring as a branch manager at Memphis.

Larry E. Gubb, chairman of the board of directors of **Philco Corp.**, has been elected president of the Cornell University Alumni Association.

Eric P. Tell, vice president of the **Novo Engine Co.**, Lansing, Mich., died recently.

Sponsorship of the 762nd Engineer Railway Diesel Shop Battalion, has been accepted by the **American Locomotive Co.**, following an invitation to the company from the Corps of Engineers. **Maj. William Rogers**, formerly a district service engineer for the company, is



FIRST 6 in April 1941

THEN 6 in October 1941

ANOTHER 6 in January 1942

Satisfied Customers Assure REPEAT ORDERS

Smith-Mobile Truck Mixer users invariably come back for additional Smith-Mobiles. A typical case is Maxon Construction Company of Dayton, Ohio. Maxon's initial order in April 1941 called for 6 Smith-Mobiles. 6 more were ordered in October 1941 . . . another 6 in January of this year . . . and now they've ordered 40 additional units.

Surely, such figures are significant. The many Smith-Mobile repeat orders come as a result of satisfactory performance. Owners prefer the HIGH DISCHARGE without hoist . . . the CONTROLLED DISCHARGE without segregation . . . the VISIBLE MIXING feature . . . the successful REAR END CHARGING . . . the Smith way of introducing water through the feed opening. Above all, they appreciate Smith-Mobile's GREATER SPEED and EFFICIENCY. So play safe! Buy time-tested Smith-Mobiles. Ask for Catalog 198-B.

The T. L. SMITH CO., 2855 N. 32nd St., Milwaukee, Wis., U.S.A.

...and Now 40

One of Maxon's 58 Smith-Mobiles Used on a Big U. S. Navy War Project.

SMITH-MOBILE

The ORIGINAL HIGH DISCHARGE Truck Mixer and Agitator

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT . . Buy the Fast . . .

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.

USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

NO Water Load to Carry...

Every gallon of water you put into the cooling system of an engine ADDS 10 POUNDS to its weight. 5 gals. = 50 lbs.

Every gallon of water pumped and delivered must be replaced periodically . . . consuming time, power and fractional man-hours.

Equipment powered by WISCONSIN AIR-COOLED ENGINES provides complete freedom from water chores and water avoirdupois . . . improving mobility as well as reducing maintenance and servicing burden. Trifles, in the aggregate, loom BIG in today's program of vital conservation.

AIR-COOLED

Model VE-4, V-type, 4-cylinder, 22 hp., air-cooled Wisconsin Engine. Weight: 285 lbs.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

senior officer in the battalion.

CHARLES LOUIS MCKENZIE, president of the **DUQUESNE SLAG PRODUCTS CO.**, of Pittsburgh, **THE CONCRETE PRODUCTS CO. OF AMERICA**, and the **LAND IMPROVEMENT AND SUPPLY CO.**, died recently at Pittsburgh, Pa.

SAUERMAN BROS., INC., Chicago, Ill., manufacturers of long range material-handling machinery, announce the appointment of J. R. **NORTON**, 11 W. 42nd St., New York, N. Y., as distributor succeeding W. R. Elden who died recently.

W. L. **ENNIS**, formerly manager of the refrigerator service and claim prevention department of the **MILWAUKEE RAILROAD** at Chicago, has been appointed assistant to the chief operating officer at Milwaukee.

THE MINNEAPOLIS-MOLINE POWER IMPLEMENT CO. has been awarded the Maritime Commission's "M" award of merit, presented at the plant recently to W. C. **MACFARLANE**, president and general manager.

NEIL C. HURLEY, president of the **INDEPENDENT PNEUMATIC TOOL CO.**, was on hand recently to receive the award of the joint Army-Navy "E" flag given his company for outstanding production at its Aurora, Ill., plant. The presentation was made on a day officially declared a holiday by the city government.

AMERICAN ENGINEERING CO., Philadelphia, Pa., has announced the retention of Prof. E. L. **MIDGETTE** as consultant for the company in its multiple activities. Professor Midgette assumes his new duties at once, although he remains at his post as professor of machine design at the Brooklyn Polytechnic Institute.

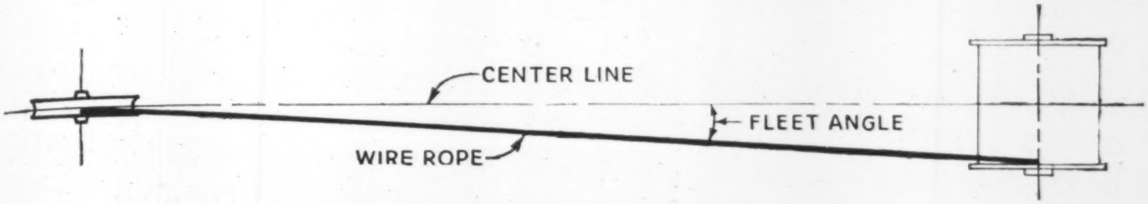
DONALD SCHWEITZER has been named new works manager of **ALLIS-CHALMERS MFG. CO.**, Springfield, Ill. He succeeds William E. Yunker, who resigned recently.

JOHN WATSON FITZGERALD, 65, research engineer for **BRIGGS & STRATTON CORP.**, inventor of many devices that contributed to the improvement of automobile operation, died recently at Milwaukee, Wis.

The **GORMAN-RUPP CO.**, Mansfield, Ohio, manufacturers of self-priming centrifugal pumps, is celebrating with a new factory a rapid growth that began when the com-

Keep fleet angles under 3 deg.

for best service from wire rope



The "fleet angle," illustrated above, is an important consideration when locating a main sheave in reference to a winding drum. If this angle is too large, there will inevitably be side-wear on the rope as it passes diagonally from the outside edge of the drum across the sheave.

Experience has shown that best results are obtained when the fleet angle is not greater than 1½ deg., with a smooth-faced drum, and not greater than 2 deg. with a grooved drum. When the fleet angle exceeds a maximum of 3 deg., wire rope service life is materially reduced. If these recommended fleet angles are followed, you will get a lot of extra service from wire rope.

Another worth-while maintenance precaution is proper alignment of sheaves. Proper sheave alignment seems like such a small matter that it may be overlooked in busy times—yet it can add greatly to wire rope service life.

To line up two sheaves properly, simply adjust them so that the rope runs straight from one to another and seats squarely in the center of each sheave groove. Even a slight misalignment can cause a great deal of wear between the rope and the shoulder of the sheave.

On certain types of work it is well to check sheave alignment from time to time during operation, to catch and correct any deviation from true alignment. For example, on timber-mounted drag-scrapers and slack-line excavators, the sheaves are apt to slip out of alignment due to a loosening of the mounting in the wood.

Mining machines—loaders, slushers and tugger hoists—should also be frequently inspected. Wire rope that operates in a mine is subject to severe wear under the best of conditions. Help the rope with maintenance precautions, wherever possible.

A third practical suggestion is to inspect the wire-rope system of clam-shell buckets for wobbly sheaves and to replace worn sheave bearings or worn axles where necessary. A wobbly sheave, or a badly worn sheave, can greatly reduce the service life of a wire rope.

Bethlehem Wire Ropes for all Purposes

BETHLEHEM STEEL COMPANY

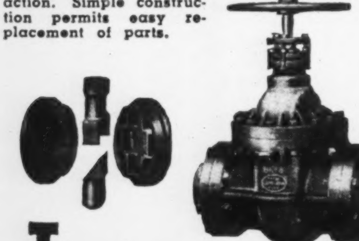
ALWAYS READY IN AN EMERGENCY

Thousands of husky doughboys who served Uncle Sam in the last war are again on duty—as guards in vital production centers, navy yards, etc.—proof of the old adage that "You can't keep a good man down."

Thousands of rugged Ludlow Valves—many of them also veterans of the last war—are on duty too, in strategic power plants, factories and institutions, proof of the fact that you *can* keep a good valve down—down in the line, where it belongs! . . . . ready for any emergency. These sturdy valves employ the famous double-disc, parallel seat principle developed and perfected by Ludlow. That means they work smoothly, close securely—even after years in the open position. In peace or war, *Ludlow means value in valves.* Send for Catalog.

THE LUDLOW VALVE MFG. CO., INC.
TROY, NEW YORK

Construction Features: Self-releasing 30° angle wedges and free floating gates, self-adjusting to seats, afford smooth, trouble-free performance, long service. Rings are cleaned throughout stroke action. Gates are wedge-locked directly opposite ports and completely unwedged before raising. Ample tolerances provide easy action. Simple construction permits easy replacement of parts.



LUDLOW VALVES

SINCE 1866

pany was organized in 1933. The first factory was a barn on H. E. Rupp's farm, but the new one consists of a monitor type steel and brick building, 120x400 ft., and a two-story brick building of 60x100 ft. plan dimensions, with modern facilities for pump production and employee comfort.

The company has also expanded its distributor organization so that it has representatives for G&R pumps in all principal cities. Among the first distributors to handle the pumps, all of whom are actively distributing the line today, are the following: H. B. Trevor Corp., Buffalo, N. Y.; Day & Maddock Co., Cleveland; Herman M. Brown Co., Des Moines, Iowa; Alamo Iron Works, San Antonio, Tex.; Harron, Rickard & McCone Co., Los Angeles and San Francisco, Calif.; Anderson Equipment Co., Omaha, Neb.; G. W. Van Keppel Co., Kansas City, Mo.; Thorman W. Rosholt Co., Minneapolis and Duluth, Minn.; W. C. Caye & Co., Atlanta, Ga.; Wilson, Weesner, Wilkinson Co., Nashville and Knoxville, Tenn.; and Parker-Danner Co., Boston, Mass.

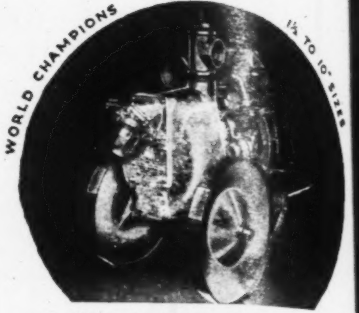
President Everett Morss of the Simplex Wire & Cable Co., Cambridge, Mass., was among those present recently when the Army-Navy "E" Award for achievement was presented at a mass meeting of employees and invited guests. Others at the ceremony included Commander Lewis L. Strauss, U. S. Navy; Major R. D. Wilhite, U. S. A.; and Major J. H. Corcoran of Cambridge.

The appointment of H. J. Humphrey to the post of vice president of the Canadian Pacific Railway Co.'s lines east of the Great Lakes has been announced. Mr. Humphrey has hitherto occupied the dual position of vice president and general manager.

William Salt, for many years head of the service department of the DeLaval Steam Turbine Co., died suddenly recently.

John J. Rammel, 74, an engineer for 32 years at the Columbia Chemical Division of the Pittsburgh Plate Glass Co. at Barberton, Ohio, died recently at his home in Akron.

Lausoff Stone, assistant to the president of the Jones & Laughlin Steel Corp., has resigned to become president of the Follansbee Steel Corp. He succeeds W. T. Brownscombe, who recently resigned.

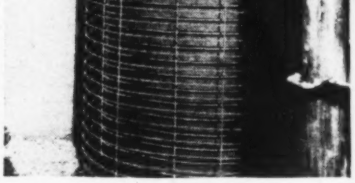


Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
- **LONG-LIFE SEAL** — Accessible for inspection.
- **PATENTED SELF-CLEANING SHELL.**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 220,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO
200 Dublin Ave., Columbus, Ohio



CIRCULAR REINFORCEMENT

The Toughest Test of Welded Fabric Quality

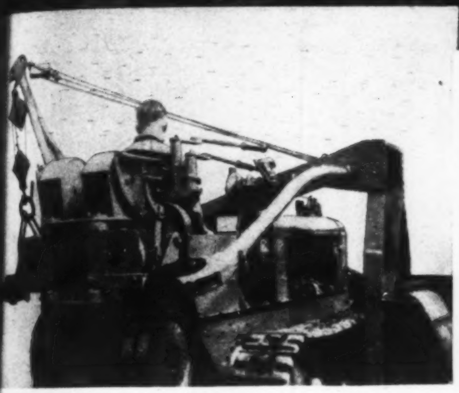
Every step in the manufacture of Clinton Welded Fabric is completed in our own plant. From blast furnace to wire, to electrical welding, it is supervised and tested by our own experts. UNIFORMITY, both in welding and in tensile strength of the wire itself, raises performance standards, and assures maximum strength at welds. Clinton Welded Fabric, the choice of experts for circular and other concrete shapes, comes in sheets or rolls, cut to your *exact* job specifications...saving you the time, trouble, and expense of on-the-job cutting and placing. Wickwire Spencer Steel Company, 500 Fifth Avenue, New York, N. Y.

WISSCO PRODUCTS

CLINTON REINFORCING FABRIC
It's Electrically Welded
WICKWIRE SPENCER

NOTHER JOB MADE *Easy!*

With BUCKEYE CABLE CONTROL, YOUR TRACTORS CAN DO MORE JOBS!



by BUCKEYE CABLE CONTROL

FASTER, easier, lower cost handling of pipe—that's what the Ohio Fuel and Supply Company secured when they designed and built the rig illustrated. A double drum medium duty Buckeye Power Control Unit made it possible, provided fast, powerful, smooth Cable Controlled operation.

Buckeye Hoists are the logical choice for a job like this. With a Buckeye single or double drum hoist you have one or two lines instantly available for operating dozers, scrapers, rippers, pavement breakers, for hoisting and elevating, pulling out stumps, towing, pulling cable through conduits and for 101 other jobs as well. They make handy men of your tractors, broaden their range of uses so that you can do more jobs, speed up operations and release manpower.

Smooth, cushioned clutch and brake action, cool operation, fingertip control, instantaneous response, ruggedness and dependability are a few of the features Buckeye Hoists offer. Write today for full information and prices on the models for your tractors. You'll be glad you did.

Ask for data on Buckeye UNITILT Bulldozers, Trailbuilders and Pushdozers

•

BUCKEYE TRACTION DITCHER COMPANY
Findlay • Ohio

•

Built by Buckeye ✓

vertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

"BUTCH HAD PRESENCE OF MIND ENOUGH TO GET THAT STRONG-HOLDING R B & W BOLT IN PLACE IN THE NICK OF TIME!"

Use R B & W Bolts and Nuts . . .

Quick-starting, quick-tightening because they are accurately, uniformly sized and threaded — and carefully inspected.

Vibration-resisting, shock-resisting because the manufacturing method insures extra strength, and all processing is controlled from raw rod to finished product.

EMPIRE BOLTS NUTS-RIVETS

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

RB&W Making strong the things that make America strong

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at Port Chester, N.Y., Rock Falls, Ill., Coraopolis, Pa.
Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

NEW PUBLICATIONS

Assembly Structures—How to Assemble Lindsay Structure is the title of a new booklet issued by the Dry-Zero Corporation. The booklet shows drawings and photographs of the component parts of the structure, detailing methods of assembly and construction.—*Dry Zero Corporation, Merchandise Mart, Chicago, Ill.*

Wood Construction—The revised 14th edition of the "Southern Pine Manual of Standard Wood Construction" is now ready for distribution. The manual contains 185 pages, including formulae, tables and useful information on design for the engineer and architect. It also covers some of the newer applications in timber design which have been developed in recent years. Many of the tables appearing in the 13th edition, issued in 1937, have been revised for the purpose of bringing them up to date in the interests of greater simplification. —*Southern Pine Association, New Orleans, La.*

Tips—"Timely Tips for the Shovel, Crane and Dragline and Crane Operator" has been published by the Lima Locomotive Works, Inc. in the interests of such operators and their employers. Within its covers are useful information pertaining to the servicing and operation of excavating equipment. The booklet is designed to make possible greater use of hard to replace shovels, draglines and cranes now in service.—*Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio.*

Calendar—With very large dates, the new Post 1943 Calendar features a weekly pad that can be seen from any point of vantage in any room of whatever size. The new calendar, with its 52 weekly sheets, is built on a war week basis, for use in drafting rooms and busy offices. A section of technical data for the engineer and draftsman is included, containing charts on wire and sheet metal gages, screw threads, etc.—*Frederick Post Co., Box 803, Chicago, Ill.*

Controllers—A description of a line of universal controllers for temperature control applications is given in Vol. 2, No. 2, of Wheelco Comments, issued by Wheelco Instruments Co. The publication describes pyrometers, potentiometers and thermometers with unit construction features that permit ready removal of each component for inspection, repair and replacement, eliminating necessity of removing the instrument from service. Also discussed are design features that permit convenient conversion of one

ENGINEERING NEWS-RECORD
ENGINEERING NEWS-RECORD
A SPECIAL SECTION ON

THEY DID IT BEFORE

When this issue of Engineering News-Record carried the latest construction news, we were still at peace—and many of the country's great projects were supplied with a dependable source of low-cost compressed air from Gardner-Denver Horizontal Compressors.

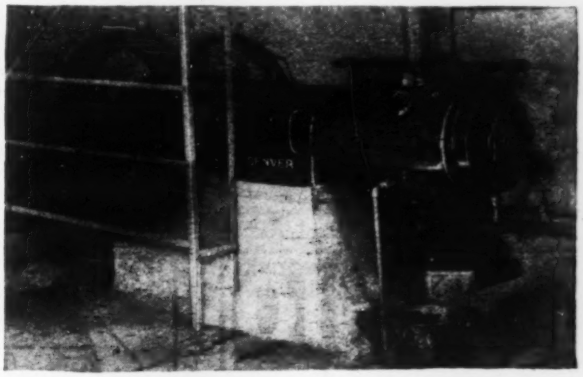
—THEY'RE DOING IT AGAIN

Today Gardner-Denver Horizontal Compressors are helping to speed the war work which cannot be delayed.

For permanent or semi-portable installation, Gardner-Denver Single-Stage and Two-Stage Horizontal Compressors assure a durable and highly efficient air supply. Rugged frame and Timken roller main bearings add years to the life of the machines. Entirely automatic capacity controls constantly regulate air output to fit your air needs. For descriptive bulletins on Gardner-Denver Horizontal Air Compressors, write Gardner-Denver Company, Quincy, Ill.

GARDNER-DENVER

Gardner-Denver Class "HA" Two-Stage Horizontal Air Compressor for heavy duty, continuous service within a capacity range of 316 to 2012 cu. ft. displacement per minute.



Class "RX" Single-Stage Compressor—ruggedly built for capacities from 89 to 1292 cu. ft. per minute.

GARDNER-DENVER PRODUCTS HELP SPEED VICTORY

GARDNER-DENVER *Since 1859*

BROTHER, THIS IS WAR
AVOID MISTAKES!

Guard precious war drawings with this special-process tracing cloth

Mistakes mean delays, and America's wartime job is to *speed* production! Give war jobs the best! That means specially-processed Arkwright Tracing cloth. Arkwright is made by a highly technical method on costly machines. The surface is clear, smooth – never "humpy." Ink lines won't spread or "feather" – nor crack or chip in drying. Years from now, drawings will be fresh and clear – truly permanent! Guard your war work this way. Arkwright Finishing Company, Providence, R. I.

Arkwright TRACING CLOTHS
AMERICA'S STANDARD FOR OVER 20 YEARS

OHIO
LOCOMOTIVE CRANES
15 to 50 TONS CAPACITY
DIESEL • ELECTRIC • GASOLINE • STEAM
The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS . . OHIO

DE LAVAL STEAM TURBINE CO.
TRENTON, N.J.
Manufacturers of
STEAM TURBINES . . . HELICAL and WORM GEARS . . . PUMPS: Centrifugal, Propeller, Clogless, Mixed Flow, Rotary Oil . . . Pump Priming Systems . . . CENTRIFUGAL BLOWERS and COMPRESSORS.

model to another. The electronic principle of effecting temperature control without mechanical contact between measuring and control components of the instruments is described.—*Wheelco Instruments Co., Harrison and Peoria Sts., Chicago, Ill.*

Doors and Grilles—A new [illegible] page general catalog, just printed by the Cornell Iron Works, Inc., illustrates all of the company's upward acting doors in wood and metal, rolling steel grilles and sliding grilles. The catalog gives complete information on recent designs which substitute wood for the critical metals. In addition to the wood rolling door, the catalog shows wood vertical lift doors in single, two and three sections; Bi-fold doors and wood canopy doors.—*Cornell Iron Works, Inc., 36th Ave. and 13th St., Long Island City, N. Y.*

Automatic Recording—A booklet that might prove useful to engineering and laboratory staffs in many industries entitled "Automatic Stress-Strain Recording," has been published by the Baldwin Southwark Division of the Baldwin Locomotive Works. The opening section of the booklet deals with specification data of the army and the navy, and includes references to special reports and bulletins issued by individual branches of the services on specific products. A summary of requirements for testing war material, in the section which follows, sets forth certain rules and standards in effect with the several branches of the armed services. Other sections are devoted to the interpretation of the stress-strain curve, and detailed descriptions of the recorders and accessory extensometers.—*The Baldwin Locomotive Works, Philadelphia, Pa.*

Switchgear — Horizontal drawout metal clad switchgear in 100,000, 150,000 and 250,000 kva. capacities at 5000 and 15,000 volts is described and illustrated in a new 12 page publication, Catalog 1110, released by Roller-Smith Co. The advantages of metal-clad switchgear in safety, reliability and ease of installation and maintenance are pointed out. Construction details on the design are described and illustrated, and complete dimensional data on the various types of gear available also are included.—*The Roller Smith Co., Bethlehem, Pa.*

Correction—In these columns of its Oct. 8 issue, *Engineering News-Record* listed a booklet published by the *Baker Mfg. Co., Springfield, Ill.*, that told of the part being played in the war effort by that company's products. Through an error, the notice implied that the company manufactured tractors, rather than bulldozers and other tractor equipment, which is its principal product.

CONCRETE ROADS

are saving millions of dollars on surface maintenance

Their superior stamina is an important war asset

Concrete highways, military access roads and streets are saving millions of dollars annually on surface maintenance—conserving large quantities of maintenance materials, and transportation facilities.

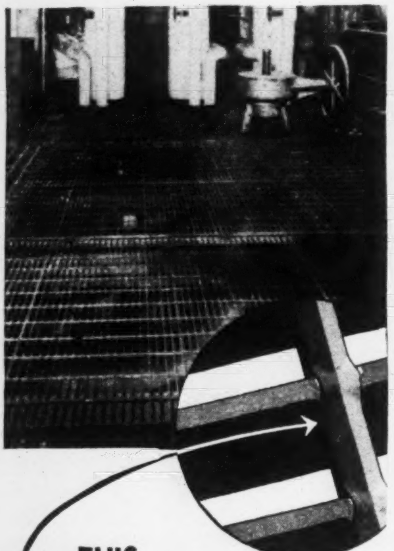
States with a substantial mileage of concrete pavement are better able to keep up with wartime maintenance demands, even with reduced revenues. The low maintenance cost of concrete is an important national asset.

Our technical staff is ready to assist military or civilian engineers in designing low maintenance cost concrete pavements for highways or airports using little or no steel.

Illustrated folder on *"Construction of Concrete Pavement in Cold Weather,"* may be of interest to you NOW. Mailed free in U. S. and Canada.

PORTLAND CEMENT ASSOCIATION
Dept. 11c-170, 33 W. Grand Ave., Chicago, Ill.

★ ★ ★ **BUY MORE WAR SAVINGS BONDS** ★ ★ ★



THIS
SCRAPER TREAD OF
BATES-GRATES
OPEN STEEL FLOORING
GIVES THE
COMBINATION OF
SAFETY AND
CLEANLINESS
YOU WANT IN OPEN
STEEL FLOORING

This extra cleanliness and safety come with the use of welding technique that, for years, has been recognized as the correct method to follow—a simple fillet weld.

There is no burning and no overflow of surplus metal around the fillet into which is press-welded Bates Hex Bar Stock. You get top strength and rigidity in steel flooring that permits the maximum passage of air and light.

Write for the new catalog "FILLET WELD BATES - GRATES" that gives complete details—well illustrated to show how advantages of this open steel flooring can be used in your plant.

FILLET-WELD
BATESGRATES

WALTER BATES COMPANY, INC.
208 S. LA SALLE STREET • CHICAGO, ILLINOIS
OPEN STEEL FLOORING, STAIR TREADS,
FLOOR ARMOR AND BRIDGE DECKING

MEN AND JOBS

Col. E. M. George, Mountain division engineer and director of the real estate repair and utilities division on the staff of the Ninth Service Command, at Salt Lake City, Utah, recently was presented the distinguished service medal for outstanding services in construction performed throughout the Ninth Service Command.

Hayden Tracy, 80-year-old retired San Francisco civil engineer, recently went back to work at the Marinship plant near Sausalito, Calif. Mr. Tracy, who retired as manager of the Tracy Engineering Co. 20 years ago, said he had returned to work to aid the nation's war effort.

Melvin McCoy has been appointed assistant to the county engineer at Pensacola, Fla.

Col. John S. Bragdon, chief of the South Atlantic division, Corps of Engineers, has received the distinguished service medal for exceptionally meritorious service.

Eight South Carolina men were members of a recent graduating class of engineer officer candidates at Fort Belvoir, Va. Newly commissioned men include **Sam P. Bolick,** of Blairs; **Charles R. Craig,** Salem; **Thomas G. Field,** Columbia; **Arthur P. Hamilton,** Graniteville; **Herbert T. Littlejohn, Jr.,** Spartanburg; **Verne A. Sims,** Columbia; **Sims H. Walker,** Navy Yard, and **Alferce E. Wrenn,** Chester.

Lt. R. P. Murphy (CEC) USNR, executive officer to the officer-in-charge of construction of Marine Barracks, North Carolina, has been transferred to Camp Allen, Norfolk, Va.

Harry H. Harrison, superintendent of the Illinois State Highway traffic control bureau, has been commissioned a captain in the transportation corps, Services of Supply. He has been granted a leave of absence for the duration by the highway department.

City Engineer **Harold O. Church,** of Zanesville, Ohio, has been granted a leave of absence to assist in construction of a $5,000,000 veterans hospital at Cambridge, Ohio.

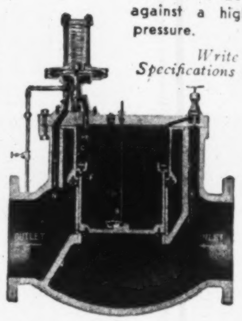
Maj. Ernest W. Steel, Corps of Engineers, who is on leave from his post as professor of municipal and sanitary engineering at Texas A. & M. College, has been detailed as advisor to the division of sanitary engineering, Ministry of Health, of Venezuela.

Single-Acting
Semi-Throttling
Altitude Valve

Installed in upstream line to tanks, standpipes or reservoirs, this valve sensitively maintains any desired water level to prevent overflow.

The valve is semi-throttling by gradually closing as water approaches the maximum water level to be controlled. The valve is self-contained without any waste of water from above the valve piston, and is especially desirable for service where a low head is to be maintained against a higher influent pressure.

Write for Specifications and Prices.



GOLDEN-ANDERSON
VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

**"Uncle Sam
Done Got Me"**

Uncle Sam has called me into service as a Captain of the U. S. Marine Corps Reserve.

I have always operated as a "one-man outfit" so I will close my **Steel Form Business** down tight for the duration. When this thing is over, you can be sure I'll be back calling on my friends and customers in the heavy construction field.

ROBERT S. MAYO
Construction Engineer
LANCASTER, PA.

★

Steel Forms
Tunnel Equipment - Air Locks
Tunnel Shields

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

CP WAGON DRILLS HAVE WIDE APPLICATION

SPECIALLY DESIGNED MOUNTING PERMITS GREATER MOBILITY

Fast, One-Man Operation of Drifters

NEW YORK (CP) — The light-weight tubular drill carriage frame mounted on three roller-bearing wheels gives the G-200 CP Wagon Drill great mobility over rough ground and fast, easy, one-man operation of the most powerful of CP Drifter type drills.

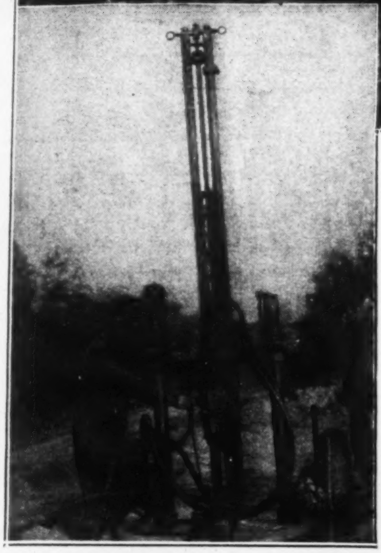
This combination of drill and mounting affords contractors on urgent wartime construction work a faster and more economical method of handling many drilling jobs on which hand sinkers would ordinarily be used.

For heavier, deeper hole drilling up to 40 feet, Type G-500 Wagon Drill is available. Write for complete data.

CHICAGO PNEUMATIC
TOOL CP COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

↑ **ROUGH GOING** for this Chicago Pneumatic G-200 Light Weight Wagon Drill on this Seattle, Washington, road job; but a 6-foot steel change and 18'-24' steels are handled quickly and easily.



← **STEADY FEED, QUICK RETURN** and ample power for pulling tight steel, feature this Chicago Pneumatic G-200 Wagon Drill because of its 4-cylinder air motor with graduated control—worm gear transmission and feed chain.

AIRPORT CONSTRUCTION speeded by the ease → with which the drill carriage is raised or lowered by chain-and-sprocket hand-operated hoist on the Chicago Pneumatic G-200 Wagon Drill. (Close-up of one of the six CP wagon drills shown below.)

↑ **SPEED IN LEVELING** rock base for grading the runways of a large eastern flying field is greatly increased by the use of ten Chicago Pneumatic G-200 Light Weight Wagon Drills — six of which are illustrated. Sliding cone on drill carriage permits rapid adjustments to fit ground conditions.

CHICAGO
CP
PNEUMATIC

ROCK DRILLS

ALSO: Air Compressors, Pneumatic Tools, Electric Tools, Diesel Engines, Hydraulic Aviation Accessories

DRIFTERS
MOTORdrifters
AUTOdrifters
SINKER DRILLS
STOPERS
DIAMOND CORE DRILLS

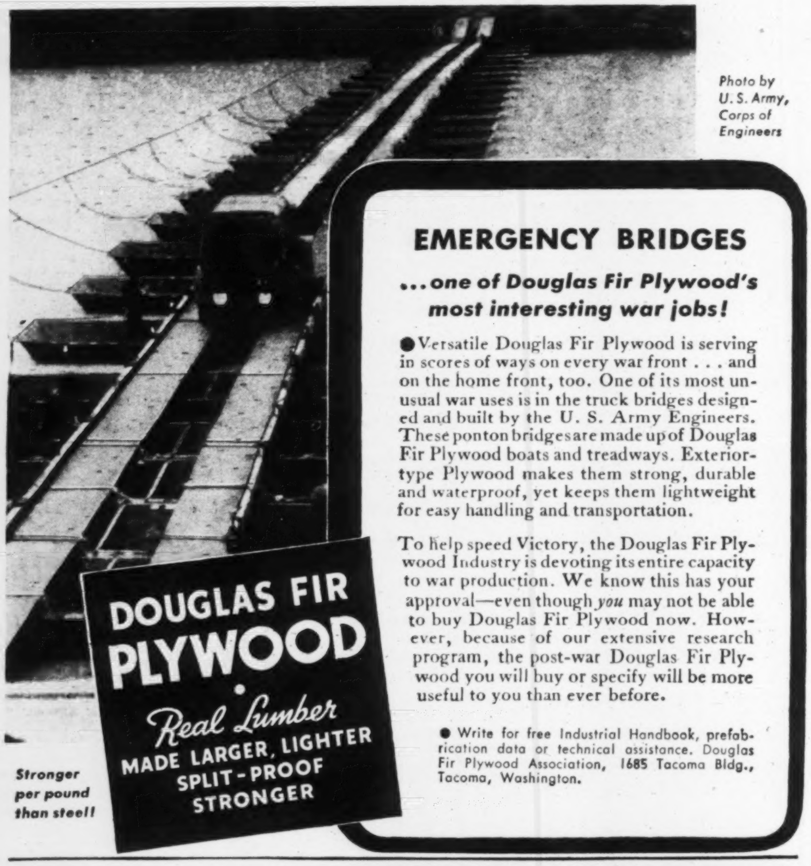


Photo by U. S. Army, Corps of Engineers

EMERGENCY BRIDGES

...one of Douglas Fir Plywood's most interesting war jobs!

● Versatile Douglas Fir Plywood is serving in scores of ways on every war front . . . and on the home front, too. One of its most unusual war uses is in the truck bridges designed and built by the U. S. Army Engineers. These ponton bridges are made up of Douglas Fir Plywood boats and treadways. Exterior-type Plywood makes them strong, durable and waterproof, yet keeps them lightweight for easy handling and transportation.

To help speed Victory, the Douglas Fir Plywood Industry is devoting its entire capacity to war production. We know this has your approval—even though *you* may not be able to buy Douglas Fir Plywood now. However, because of our extensive research program, the post-war Douglas Fir Plywood you will buy or specify will be more useful to you than ever before.

● Write for free Industrial Handbook, prefabrication data or technical assistance. Douglas Fir Plywood Association, 1685 Tacoma Bldg., Tacoma, Washington.

DOUGLAS FIR PLYWOOD

• Real Lumber

MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

Stronger per pound than steel!

...A LARGE SHAFT...A SMALLER CONNECTING TUNNEL... BOTH

EFFICIENTLY SPEEDED TO COMPLETION WITH COMMERCIAL LINER PLATES

Here are two jobs of similar nature, yet different in construction technique, which were speeded to completion through the use of COMMERCIAL Tunnel Liner Plates and Supports. The circular shaft and oval-shaped tunnel serve to demonstrate the versatility of COMMERCIAL Products. Note the "clean" appearance . . . hardly any bracing . . . this is definitely a time and money-saving feature. For tunnels . . . for shafts . . . any size and shape, in any kind of ground . . . COMMERCIAL has a suitable plate or support. Write for details for your next tunneling job.

THE COMMERCIAL SHEARING & STAMPING CO.

YOUNGSTOWN OHIO

MEETINGS

HIGHWAY RESEARCH BOARD, 22nd annual meeting, Hotel Statler, St. Louis, Mo., Dec. 2-4.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Hotel Statler, St. Louis, Mo., Dec. 7-9.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, Society headquarters, New York, N. Y., Jan. 20-22, 1943.

REGIONAL AND LOCAL MEETINGS

NEW YORK STATE HIGHWAY CHAPTER, A.G.C., war conference, De Witt Clinton Hotel, Albany, N. Y., Dec. 9 (dinner)-10.

NORTHERN CALIFORNIA CHAPTER, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 24th annual convention, Palace Hotel, San Francisco, Dec. 11-12.

Elections and Activities

THE NORTH CAROLINA Section of the American Society of Civil Engineers held its annual fall meeting at Durham Nov. 3, in conjunction with the annual joint convention of the North Carolina Section of the American Water Works Association, and the North Carolina Sewage Works Association. Speakers at the A.S.C.E. meeting included: T. S. Johnson, of Raleigh; Prof. Louise Hall, of Duke University School of Engineering, Durham; and William M. Piatt, of Durham.

T. F. Hickerson, professor of applied mathematics at the University of North Carolina, Chapel Hill, is president of the section, with Joseph N. Stribling, of Charlotte, vice president, and George H. Maurice of Eagle Springs secretary-treasurer.

MILTON P. ADAMS was elected president, George W. Francis, first vice-president, Clair C. Johnston, second vice-president, and George McCordic, secretary, of the Detroit chapter of the American Society of Civil Engineers, at a recent meeting.

THE Technical Valuation Society will hold its annual forum on Dec. 12 at New York City in the Engineering Societies Building. Sessions will be devoted to economists, appraisers, and valuation engineers who will present papers and direct discussions on many pressing valuation problems, particularly in their relation to the war effort.

AT A WARTIME conference of the South-

Enlist that Scrap

... FOR THE DURATION

SAVE
SALVAGE

When you turn in your scrap *this month*, your obligation does not end: For the steel furnaces must run next month, too -- and the next -- and the next.

Steel production of eighty-five to ninety million tons of ingots a year calls for approximately 3,000,000 tons of scrap per month--about 750,000 tons a week--over 100,000 tons a day. Half of this comes from the industry itself, but the other half must come from the public.

Reduced to its simplest terms, if the steel industry is to produce steel at the rate and in the volume that our war program demands, then America must collect nearly ONE POUND OF SCRAP EVERY DAY for each man, woman and child in the nation.

You, the reader of this publication, have this clear, individual obligation: As a patriotic citizen and a responsible executive or workman, you must act to the extent of your ability to KEEP SCRAP FLOWING to the steel plants.

Do your part to enlist scrap for the duration.

WHY NOT TRY THIS YOUNGSTOWN IDEA?

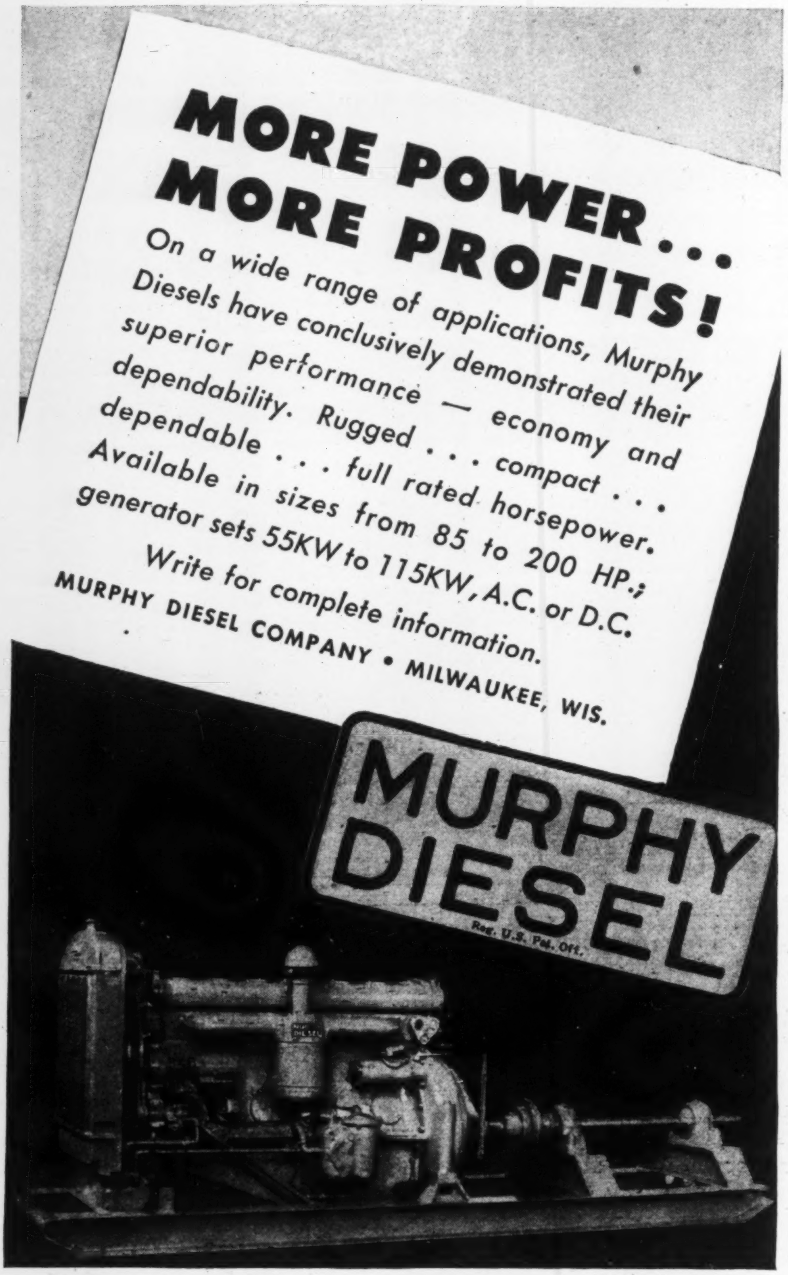
Red-white-and-blue barrels like this stand on important street corners, in both business and residential districts of Youngstown, Ohio. They provide a convenient and tangible means of getting action from citizens, young and old, who are bombarded daily with radio, newspaper, magazine and other advertising urging them to turn in scrap.

That this is an effective idea is proven by the fact that two city trucks are kept busy every day, collecting scrap from these barrels and answering calls from householders who have other scrap to contribute, too large to go into the barrels. Perhaps YOUR city can try this plan, too.

This Company joins in the counter attack against accidents by subscribing to the National Safety Council's War Production Fund to Conserve Manpower

QUALITY
TRADE MARK
YOUNGSTOWN
SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO


MORE POWER...
MORE PROFITS!

On a wide range of applications, Murphy Diesels have conclusively demonstrated their superior performance — economy and dependability. Rugged . . . compact . . . dependable . . . full rated horsepower. Available in sizes from 85 to 200 HP.; generator sets 55KW to 115KW, A.C. or D.C.

Write for complete information.

MURPHY DIESEL COMPANY • MILWAUKEE, WIS.

MURPHY DIESEL
Reg. U.S. Pat. Off.

BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND, O.
Bailey Meter Co. Ltd., Montreal, Canada

"GUNITE"

can reduce your construction costs. It is efficient and dependable, an established product.
WE RECOMMEND "GUNITE" for structural steel protection, floor and roof slabs, thin exterior walls, partitions, tanks, reservoirs, restoring disintegrated concrete surfaces, repairing reinforced concrete, etc. Let us suggest how "Gunite" can best solve your problems.

PRESSURE CONCRETE CO.
"GUNITE" CONTRACTORS
6 Avenue B Newark, N. J.

west section of the American Water Works Association, held in Little Rock, 329 registrants from Arkansas, Louisiana, Oklahoma, and Texas were [illegible] L. A. Jackson, manager of the Little Rock municipal waterworks, was elected president to succeed W. F. [illegible], of Tulsa.

Egmont S. Smith, of Dallas, Southwest manager of the Neptune Meter Co., received the George W. Fuller Award for outstanding service.

A. M. FOUNTAIN has been named chairman of the North Carolina State College Branch of the Society for the Promotion of Engineering Education. He succeeds H. B. Briggs. William Hand Browne, Jr., was elected vice chairman; T. C. Brown was made secretary-treasurer, and W. G. Van Note was elected corresponding secretary.

THE Springfield, Ill., Engineers Club, recently sponsored an open meeting at which David C. Prince, vice president of General Electric Co., spoke on "An Approach to Post-War Planning."

Mr. Prince, chairman of the company's special committee to plan post-war operations, is a member of its advisory and apparatus sales committee as well.

THE AMERICAN ASSOCIATION of State Highway Officials will meet at St. Louis, Mo., Dec. 7-9.

THE NINTH ANNUAL convention of the Canadian Institute of Sewage and Sanitation was held in Toronto recently, sessions being largely devoted to special problems arising from war conditions. B. F. Lamson was elected president, succeeding W. L. McFaul. Mr. Lamson is a city engineer of St. Catherines, Ont.

Other officers elected were R. H. Parsons, vice president, and R. J. Desmarais and David Jack, trustees.

Concurrently with this meeting, there was organized the Canadian Sanitary Equipment Association, a trade body paralleling the Institute. R. H. Shook, assistant sales manager of the National Sewer Pipe Co. Ltd., of Toronto, was elected first president.

At the closing luncheon of the convention, K. M. Cameron, chief engineer of the Department of Public Works of Canada, spoke on post-war reconstruction. He urged engineers of all Canadian municipalities to plan now in detail work projects that can usefully be started when the war is over.

THE TENTH ANNUAL Illinois Water Plant Operators Conference, sponsored by the state department of public health, was held at Springfield Nov. 4-5.

Besides regular problems sessions, the conference included demonstrations of

HELPFUL LITERATURE

for Oxy-Acetylene Welding and Cutting Operators

As part of our service to industry, the Linde organization makes available a library of oxy-acetylene process information. A partial list of this "how-to-do-it" literature is shown here. If you need copies of any of the booklets described, you can obtain them from any Linde office, without charge. Please ask for them by Form numbers.

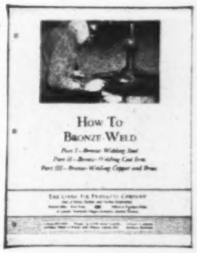
Oxy-Acetylene Welding Data

The Linde Air Products Company

OXY-ACETYLENE WELDING DATA

12 pages—Form 4600

Charts, tables, and recommended welding methods; choice of flame adjustments, welding rod, and flux; methods for identifying metals; physical properties of familiar metals; temperature data chart; and a conversion table for hardness numbers are included in this booklet.

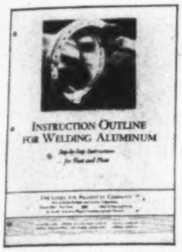

How To Bronze Weld

The Linde Air Products Company

HOW TO BRONZE-WELD

16 pages—Form 4328

This booklet discusses the theory and advantages of bronze-welding, and describes by means of step-by-step pictures correct techniques for bronze-welding steel, cast iron, copper and brass. Bronze-welding and bronze-surfacing techniques are also shown in pictures of practical applications.

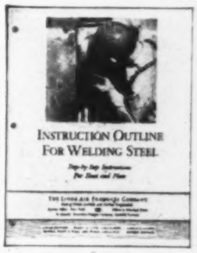

Instruction Outline for Welding Aluminum

The Linde Air Products Company

INSTRUCTION OUTLINE FOR WELDING ALUMINUM

8 pages—Form 4538

Instructions for welding aluminum sheet and plate, including the choice of proper flame and rod, the joint design, the use of jigs and supports, and cleaning and fluxing, are given in step-by-step illustrations. How the physical characteristics of aluminum affect welding technique is also discussed.

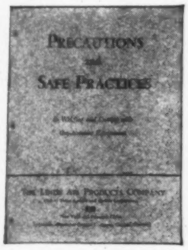

Instruction Outline For Welding Steel

The Linde Air Products Company

INSTRUCTION OUTLINE FOR WELDING STEEL

20 pages—Form 4645

This is a series of practice exercises ranging from primary melting to making position butt welds in steel sheet and plate. Instructions for blowpipe manipulation and rod deposit, and examples of both good and poor welds, are included for guidance in correcting faulty procedure.

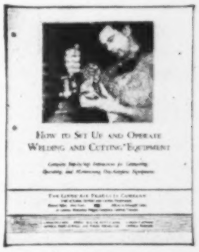

Precautions and Safe Practices

The Linde Air Products Company

PRECAUTIONS AND SAFE PRACTICES

56 pages—Form 2035

A copy of this booklet should be in the hands of every operator of oxy-acetylene welding and cutting equipment. It completely covers all the safety precautions that should be observed in setting up and operating equipment, in handling calcium carbide and oxygen and acetylene cylinders, and in maintaining equipment.


How to Set Up and Operate Welding and Cutting Equipment

The Linde Air Products Company

HOW TO SET UP AND OPERATE WELDING AND CUTTING EQUIPMENT

20 pages—Form 5165

Complete, step-by-step illustrated instructions for connecting, operating, and maintaining oxy-acetylene welding and cutting equipment. A careful study of the various suggestions in this booklet will aid all operators in getting the most out of their equipment, and will help to promote safety.

Oxy-Acetylene Heating for Bending, Straightening and Forming

The Linde Air Products Company

OXY-ACETYLENE HEATING FOR BENDING, STRAIGHTENING, AND FORMING

8 pages—Form 4200

The many applications of the oxy-acetylene flame for "smithing" operations, its use in automotive production and repair, in the boiler shop, and for upsetting and stretching, are reviewed. Three methods for straightening bent shafts are given.

Steel Hard-Facing Procedure

The Linde Air Products Company

STEEL HARD-FACING PROCEDURE

8 pages—Form 3491

The special instructions given here, based on the general hard-facing procedures, should prove helpful to everyone applying Haynes Stellite alloy to steel surfaces. A chart of hard-facing materials data and a listing of suggested hard-facing applications are also included.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 E. 42nd St., New York, N. Y. UCC Offices in Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

The words "Haynes Stellite," "Oxweld," "Linde," "Prest-O-Lite," "Union," "Prest-O-Weld," and "Purox" are trade-marks

**LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE
OXWELD, PUROX, PREST-O-WELD APPARATUS . . . OXWELD SUPPLIES**

THIS
STEEL SHEETING
SAVES
TIME AND METAL

Metal sheeting is a military *must* on many important war projects. Yet you want to be sure you are making the best possible use of it because steel is precious. So consider the economics of ARMCO Steel Sheeting.

This sturdy, light-weight sheeting goes in fast and easily owing to its smooth surface and small displacement—and still it can readily be pulled and used over and over again. This saves time and conserves steel for the war effort.

You can save even more time and metal by ordering ARMCO Sheeting in the exact gage and type you need. Interlocking, flange and clip-types are supplied in 8, 10 and 12 gage, in 12 and 14-inch widths, and in standard lengths up to 18 feet. Lengthwise corrugations provide ample strength, also make the sheeting nestable, simplifying storage and shipping problems. When you order ARMCO Sheeting, you can call on ARMCO engineers for help in solving unusual and difficult applications. Write or wire for quotations. Armco Drainage Products Association, 1055 Curtis Street, Middletown, Ohio.

* * ARMCO * *

ARMCO SHEETING

wartime problems and emergency instruction. A "gas decontamination seminar" was led by William H. Cary, Jr., regional sanitary engineer of the Office of Civilian Defense. A similar seminar on protective concealment of waterworks was led by John Hopkins, also of the OCD.

Other speakers included C. W. Klassen, chief state sanitary engineer; and J. G. Weart.

A. T. PROCTOR, minister of highways and transportation for Saskatchewan, was elected president of the Canadian Good Roads Association at the conclusion of its annual convention, held at the Seigniory Club, Montebello, Quebec.

Mr. Proctor succeeds J. P. McIntyre, minister of public works for Prince Edward Island. The conference passed many resolutions, one of which stressed the importance of road building, with federal assistance, as a necessary postwar measure in Canada. Another dealt with federal contributions to road construction necessitated by military and air force camps and works, and a third called for study of standardization of weight restrictions for inter-provincial truck and bus traffic, where climatic and topographic conditions are similar.

W. H. HALL, dean of the Duke University School of Engineering, at Durham, N. C., was elected chairman of the North Carolina section of the American Water Works Association and the North Carolina Sewage Association at an annual joint meeting held at Durham Nov. 3-4.

Other officers elected were: J. R. Purser, Charlotte, vice chairman; R. S. Phillips, Durham, secretary-treasurer; William M. Piatt, Durham, director; J. W. Kellogg, of Raleigh, and W. E. Yow, of Asheboro, trustees.

The George W. Fuller Memorial Award, presented annually to members of the section for outstanding or meritorious work in improving waterworks service, was awarded to W. M. Franklin, of the Charlotte water department. The McKean Maffitt Award was presented to Dr. Warren H. Booker, of Raleigh, director of the sanitary engineering division of the North Carolina State Board of Health.

THE CALIFORNIA SECTION of the American Water Works Association held a "Wartime Conference" at Oakland, Calif., recently, in lieu of an annual convention, devoting all sessions to an exchange of views on wartime subjects.

Included in the program were such subjects as war problems of the East Bay Municipal Utility District, by J. S. Longwell, chief engineer and general manager; common sense attitude in guarding, by George A. Hunt, guard coordinator, Pacific Gas & Electric Co.;

Here's where
you can get that
galvanizing job
turned out within
24 hours

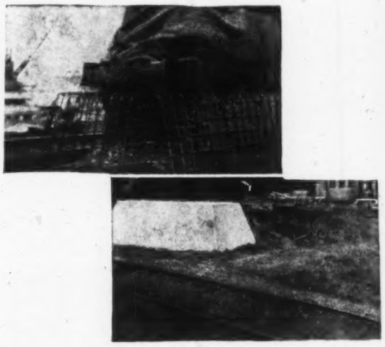
★ We can do this with most war orders, of most any size . . . Producing the finest Quality work to meet your most exacting specifications.

SEND IT TO

ENTERPRISE
GALVANIZING
COMPANY
2500 E. CUMBERLAND ST., PHILA., PA.

"To Economize—
Galvanize at Enterprise!"

"GUNITE"
FOOTINGS



More than fifty concrete footings for crane runway columns, in a large eastern plant, became seriously disintegrated several years ago. The photos show how reinforced "GUNITE" made them "better than new."

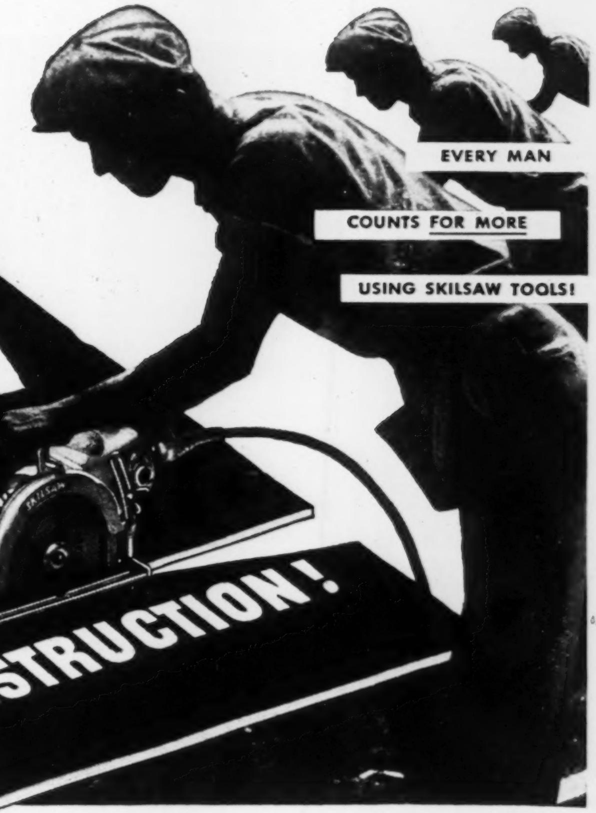
Write us, outlining your reconditioning problem. We'll show you how to save your structure, and save money doing it!

The "CEMENT GUN" can be bough by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

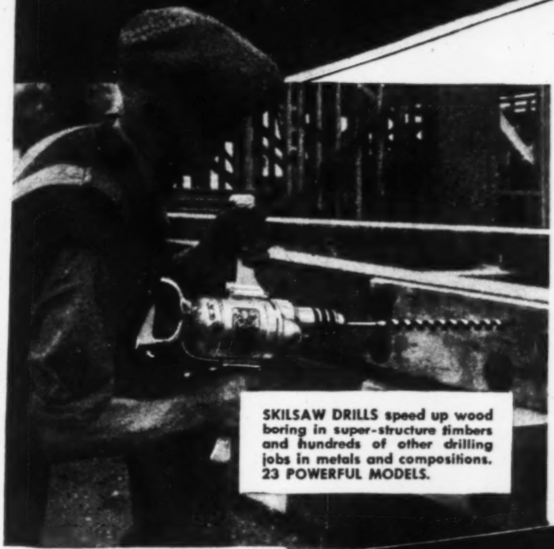
WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

The hours you save with SKILSAW TOOLS HELP SAVE THE DAY on WAR CONSTRUCTION!



● Wherever you see SKILSAW TOOLS on War Construction, buildings go up faster, camps get finished earlier, plants start to produce sooner! SKILSAW TOOLS save minutes on every operation, hours on every job, days on every project. That's why they're *preferred* by 9 out of every 10 War Contractors EVERYWHERE.

SKILSAW TOOLS are lighter, more compact, more powerful. They do more jobs—so fewer men are needed. And they're *dependable*—built to stand up under constant, hardest usage without time-wasting breakdowns. Ask your distributor for a demonstration of SKILSAW TOOLS *today!*



SKILSAW DRILLS speed up wood boring in super-structure timbers and hundreds of other drilling jobs in metals and compositions. 23 POWERFUL MODELS.

SKILSAW PORTABLE ELECTRIC TOOLS

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

SKILSAW trims roof sheathing after it is nailed in place to save extra time. Makes every cut in lumber, metals, tile and compositions. 9 POWERFUL MODELS.

SKILSAW, INC., 4771 Winnemac Ave., Chicago
New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans
Dallas • Los Angeles • Oakland • Seattle • Toronto Canada

Plymouth Locomotive (in service of a major oil company) equipped with Le Roi engine.
LE ROI POWERED
for more HP hrs. per $

. . . like many other types and makes of equipment vital to our war effort

Heavy-duty equipment requires dependable power — whether in peacetime, when only your profits and reputation are at stake, or in wartime, when our national safety depends on fast, uninterrupted service and fuel economy. • In war and peace, Le Roi engines deliver the performance you need for successful operation — special Le Roi features reduce time loss and expense of maintenance. That is why Le Roi engines are standard equipment on so many leading makes of construction machinery. Get Le Roi power on *your* equipment, whenever available. E-13

LE ROI COMPANY • MILWAUKEE, WIS.

KEEP 'EM ROLLING
ON
EWC WHEELS
FOR ALL KINDS OF ROAD MACHINERY
EWC WHEELS

FOR over half a century, dependable EWC Wheels and Axles have helped keep the job rolling along. Today, when efficient speed is more important than ever, you'll find our engineering experience at your service—ready to render valuable aid in maintaining your "rolling stock" at peak performance. Write for Illustrated Bulletins describing our service on Wheels, Axles, or Mountings. (Rubber tired wheels available on direct War Orders.)

Electric Wheel Co., Dept. NR, Quincy, Ill.

Typical Users of Electric Wheel Products

Gardner-Denver Co., Quincy, Ill. • Barber Greene Co., Aurora, Ill. • Ingersoll-Rand Co. • Geo. Haiss Mfg. Co., N. Y. C. • Chicago Pneumatic Tool Co., N. Y. C. • Pioneer Engineering Works • Schramm, Inc., West Chester, Pa. • T. L. Smith Co., Milwaukee, Wis. • LeRoi Company, Milwaukee, Wis. • Jaeger Machine Co., Columbus, Ohio.

and other addresses by Richard Bennett, hydraulic engineer, Phoenix water department; Sterling Green, Los Angeles Bureau of Waterworks and Supply, and George W. Pracy, superintendent of city distribution, San Francisco water department.

Officers elected for the ensuing year were: president, J. S. Peters, chief engineer, Marin municipal water district; vice president, Burton S. Grant, Los Angeles Bureau of Waterworks and Supply. Los Angeles was selected as the city for the next annual meeting.

Carl M. Hoskinson, superintendent, water and sewer department, Sacramento, received the George W. Fuller award.

THE Oklahoma Society of Professional Engineers will hold their annual convention at Oklahoma City, Jan. 16, 1943.

E. H. LLOYD, Elgin, was elected chairman of the Illinois Water Plant Operators Association in a meeting held in Springfield recently. Harry Rule of St. Elmo was made vice chairman, and Paul Harris, Herrin, secretary.

OFFICERS of the Wisconsin County Highway Commissioners' and County Highway Committee Members' Association, who have been conducting a road school annually since 1912, decided recently to forego this year's school due to transportation difficulties.

THE Eastern Photoelasticity Conference, sponsored by the department of mechanics at the Illinois Institute of Technology, was held Nov. 13-14, on the college campus in Chicago, Ill.

Peru builds hotels on Pan-American highway

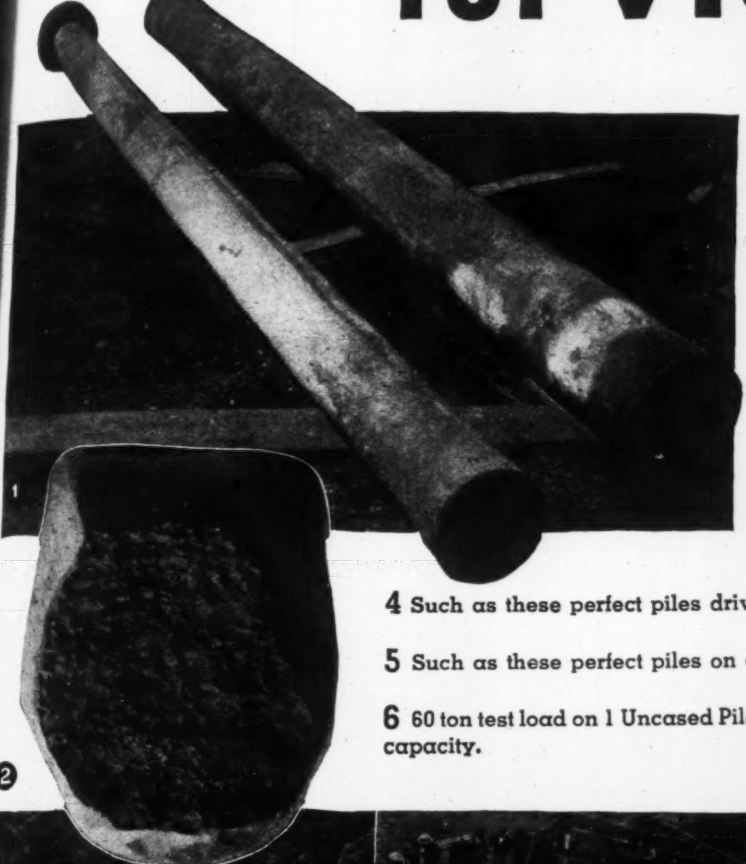
Having completed its section of the Pan American highway extending from Ecuador south to Chile and Bolivia, Peru has recently completed the ninth of a chain of 20 hotels to be conveniently spaced along the highway and auxiliary roads.

The largest of the hotels will be at Cuzco and will have accommodations for 150 guests. Others will provide shelter for 39 guests. To date, the nation has invested over $1,200,000 in these hotels to be administered by the Hotel Company of Peru, Inc.

• • •

ALTHOUGH lack of essential materials will delay construction of a half million dollar drawbridge at Wildwood, N. J., the project will be kept intact until the post-war period, according to State Highway Commissioner Spencer Millen, Jr.

How We Save METAL for VICTORY!



1 We drive these! Heavy steel driving casing, and core, before assembly.

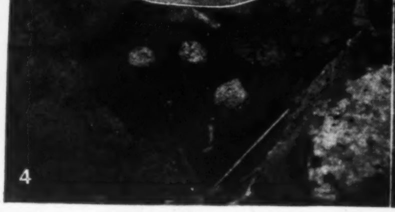
2 Withdraw the core, place this low slump concrete, and withdraw the driving casing while the concrete is being compressed under approximately 7 tons pressure.

3 Producing perfect piles, which are rugged columns of compressed concrete . . . structurally sound all the way through and *full* diameter from top to bottom.

4 Such as these perfect piles driven in sloppy, mucky soil.

5 Such as these perfect piles on close centers.

6 60 ton test load on 1 Uncased Pile . . . demonstrating *extra* bearing capacity.

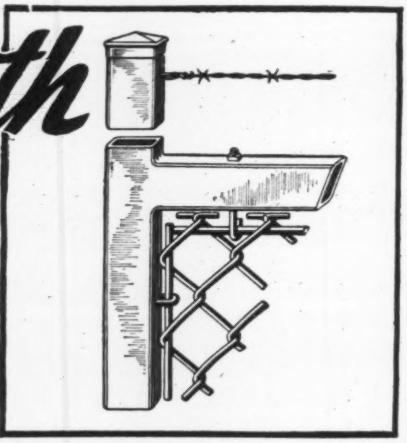


6
U.S.H.A. HOUSING PROJECT
LAWRENCE MASS.
COMPRESSED CONCRETE PILES
MACARTHUR CONCRETE PILE CORP.

The performance of our uncased (without steel casings) concrete piles under important structures for 32 years proves that the MacArthur Method of compressing low slump concrete makes the use of permanent metal casings ordinarily not only unnecessary but wasteful . . . wasteful even in peace-time.

MacARTHUR

CONCRETE PILE CORPORATION, 18 East 48th Street, New York City
Established 1910
BOSTON: 6 Beacon Street • NEW ORLEANS: 823 Perdido Street • CINCINNATI: 1542 Shenandoah Avenue



Strength

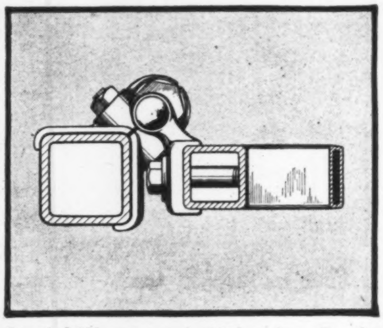
WHERE IT'S

NEEDED

MOST

Anchor Square Frame Gates

. . . always swing freely, latch easily, look more attractive, even after years of service. *Exclusive* Anchor construction of strong, 2-inch square steel tubing, inseparably butt-welded at *all* corners, provides amazing rigidity, freedom from sagging, warping. The fabric is firmly held by rounded steel tension rods. Single and Double types. Find out how Anchor Gates, and other exclusive Anchor features provide extra protection, durability, low maintenance cost. Write for Anchor Fence Industrial Catalog, and name of nearest Anchor Fence Engineer. ANCHOR POST FENCE CO., 6665 Eastern Avenue, Baltimore, Md.



Special Hinges permit 180° swing. Can be adjusted to open either in or out. Clamp to the gate. No holes to weaken the gate structure or to admit moisture.

1892 - 1942
Fifty Years of Service

Nation-Wide Sales
and Erecting Service

ANCHOR
FENCE

MITCO
OPEN STEEL FLOORING

Pressure Formed
90% Open Area
Easy to Install

Hendrick Manufacturing Company
45 Dundaff Street. Carbondale, Pa.

NEPTUNE
METER COMPANY

THE
WORLD'S LARGEST
MAKERS OF
LIQUID METERS
1892 . . . 1942

50 West 50th St., New York City
Branches in Principal American Cities
and in Canada

Trident Meters

TRENDS IN THE NEWS

Soil-Cement Surfacing for Tropical Airports

Soil-cement was used successfully for emergency runways on a tropical airport, according to "Soil-Cement News" of the Portland Cement Association, Chicago. At a tropical location that cannot be revealed at the present time, the type of construction originally planned could not be carried out because of rather heavy daily rains. Finally, an engineer who had had some experience with soil-cement construction suggested that that type of construction be used, taking advantage of the rains that same each day to provide the necessary moisture. Without regular testing equipment, the engineer molded enough specimens to determine roughly what mixtures would be most satisfactory to meet local conditions. Then, with the equipment improvised on the job, the runway was built and has served satisfactorily.

• • •

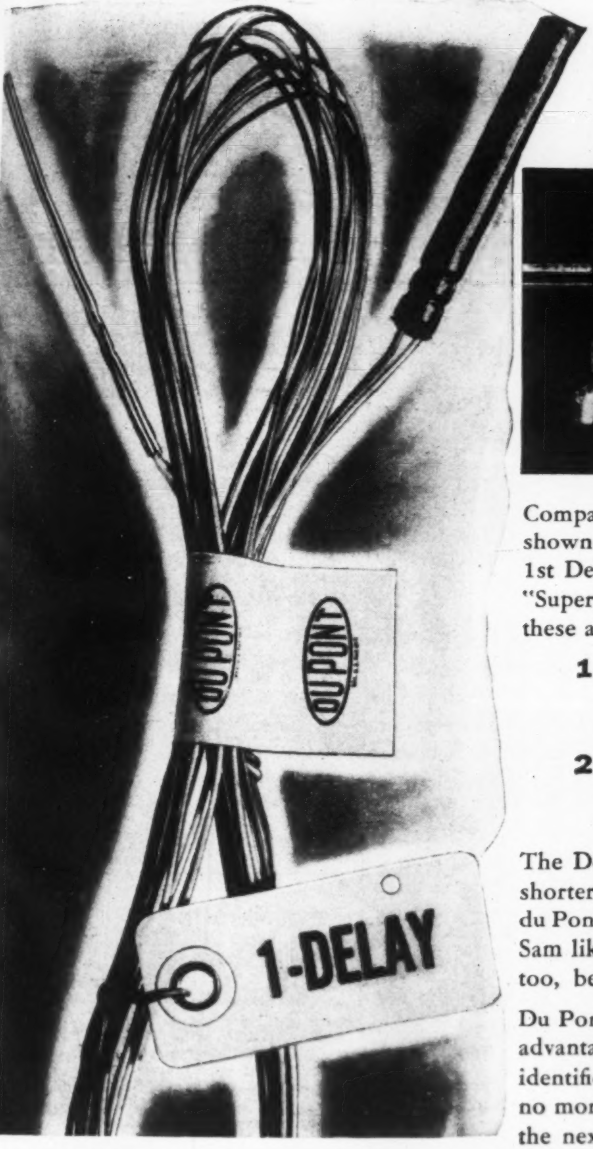
War Brings Efficiency In Municipal Operations

Local governments have been forced by the war to operate with greater efficiency as well as economy, an International City Managers' Association survey shows. Wartime problems involving priorities, and shortages in manpower, materials and equipment have stimulated this development.

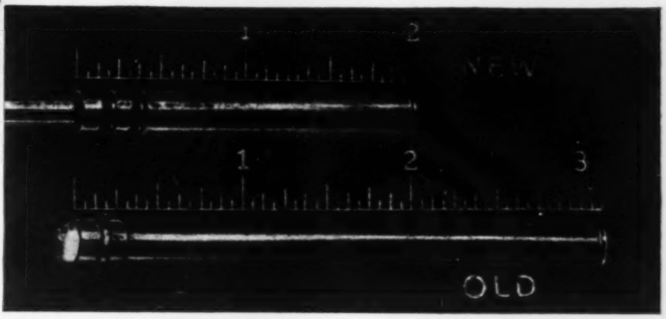
Improvements in operating efficiency reported by cities covered by the study—30, representing all population groups—include such methods as installation of new accounting and budget control systems, central purchasing offices to effect economies in buying governmental supplies, refinancing bonds at lower interest rates and retiring municipal debts to save interest costs.

More efficient operation of municipal motor vehicle equipment was reported by several cities, including installation of records systems to save on maintenance, gas and oil consumption and repair costs; servicing of equipment at night to keep it in use and save man-hours; requiring

EASIER, SAFER PRIMING WITH DU PONT DELAY CAPS



"Superior Plug"
saves copper for war needs,
increases dependability



Compare the newer type Du Pont Delay Electric Blasting Cap shown above (*top*) with the old style (*bottom*). Both are 1st Delays, but the new type is equipped with the Du Pont "Superior Plug," a major improvement in design that gives these advantages:

1. **A SHORTER CAP**—that makes priming a cartridge easier and safer, yet contains the same explosives charge and strength.
2. **BETTER WATER RESISTANCE**—that surpasses former standards for *waterproof* caps and is always the same, regardless of temperature changes.

The Delay with the Du Pont "Superior Plug" is a full 1⅛" shorter than that using the old type closure and this is true for du Pont caps of every delay period. It's an improvement Uncle Sam likes because it saves copper—and it's one you will like, too, because of the increased ease and safety of priming.

Du Pont Delay Electric Blasting Caps with these exclusive advantages are available in ten standard periods—clearly identified by perforated tags of contrasting colors. They cost no more than ordinary delay electric caps. Why not try them the next time you order? E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

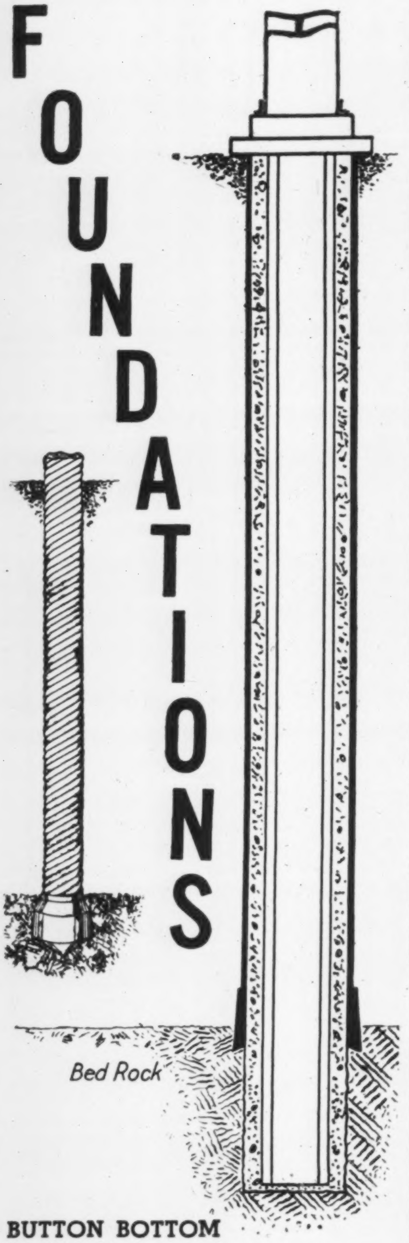
HELP SAVE FATS FOR EXPLOSIVES
Kitchen fats are urgently needed for making glycerin—an essential ingredient in the production of high explosives. Urge housewives in your area to aid the war effort by taking waste fats to their butcher.

DU PONT
REG. U. S. PAT. OFF.

EXPLOSIVES

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

FOUNDATIONS



BUTTON BOTTOM
COMPOSITE—STEEL PILES
COMPRESSED CONCRETE
CAISSON PILES

DRILLED-IN CAISSONS
Engineers available for consultation on any foundation problem. Catalogues on request.

WESTERN
WESTERN FOUNDATION CO.
WESTERN CONCRETE PILE CORP.

308 W. Washington St.
Chicago, Ill.

52 Vanderbilt Ave.
New York, N. Y.

that city-owned cars be housed in the city garage at night and restricting use of the cars during the day.

Cities also, on basis of the Association's survey, are installing modern equipment where available to get more work done with fewer employees, and are operating refuse collection trucks in pairs so helpers will be busy loading trucks instead of riding to and from city dumps part of the time.

Methods of local governmental economizing, the study showed, include reducing amount of travel on official business, stricter control over sick leaves, repairing of motor equipment by the city instead of higher-charging private garages, eliminating bill collectors by collecting delinquent accounts by mail, using auxiliary police for part-time traffic work, closing swimming pools and discontinuing municipal celebrations, festivals and band concerts.

• • •

Wisconsin Sets Up Program To Safeguard Forests

Wisconsin forests, now partially restored, will be protected from exploitation to meet the wartime timber market if a program proposed by the state conservation commission becomes effective, according to an announcement by the American Society of Planning Officials.

So great have been demands for wood and lumber recently in the state—as in other lumber producing states—that Wisconsin forestry authorities fear reforestation work of the last 10 years may be endangered, especially in the northern counties.

The forest-saving program consists of voluntary agreements by producers and users of timber and forest products that they will aid in conserving the state's forests during the war period.

Under one agreement, proposed to 120 wood-using industries and timber operators, buyers and users of forest products would reject timber which does not meet certain specifications according to size. Spruce, balsam, pine and tamarack, for example, would not be accepted for pulpwood unless more than four inches in diameter, and hemlock, five inches.

Lumber operators and producers, likewise, will be asked to sign agreements that they will practice adequate

Here are 10 basic books of day-in-day-out value in ONE low-priced volume

This book is carefully planned to give the information needed by men who actually plan, select, design, and construct civil engineering structures and projects—in one compact volume and at a reasonable price. The new 1940 edition blends theory, practice and fundamentals equally; and answers your questions in *any* division of civil engineering.

CIVIL ENGINEERING HANDBOOK

Editor-in-chief: L. C. Urquhart, Professor of Structural Engineering, Cornell University. 2nd edition. 870 pp., illus., $5.00.

Here are the fundamentals of the various subdivisions of civil engineering for the use of practicing engineers confronted with specific problems, particularly those outside their specialized fields. The book offers you ten complete treatises on the ten major subdivisions of civil engineering, each written by a specialist of international reputation in his field.

10 BIG SECTIONS

- Surveying
- Railway and Highway Engineering
- Mechanics of Materials
- Hydraulics
- Stresses in Framed Structures
- Steel Design
- Concrete
- Foundations
- Sewerage and Sewage Disposal
- Water Supply and Purification

Civil Engineering Handbook
Urquhart
Civil Engi
Handb

SEE IT 10 DAYS

SEND THIS COUPON TODAY
McGRAW-HILL BOOK CO., INC.
330 West 42nd Street, New York City

Send me Urquhart's Civil Engineering Handbook for 10 days' examination on approval. In 10 days I will send $5.00, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

Name ....

Address ....

City and State ....

Position ....

Company .... NR 11-19-42

RUSH is the *one* word he contractor knows today

PLANTS to make more planes and tanks and engines . . . dams to furnish more power and water . . . highways to carry more troops and munitions . . . fields to launch and land more bombers . . . ships to carry more cargoes . . . there's the job and the rush that confront almost every contractor today. Every minute he can shave off his completion time, every short-cut he can take to hurry construction along, counts BIG in the final reckoning, the day when we meet Hitler head on.

Only the fastest tools can do the fastest work. Only the most dependable, soundly and ruggedly constructed equipment can avoid the costly interruptions that result from untimely breakdowns. Only the simplest designs can be serviced in a hurry and on the job. What contractors say about Sullivan equipment . . . that it's built better, out of better materials, and with better and simpler designs . . . should be of enormous interest to *you*. And Sullivan compressors and air tools are going in huge quantities to many of the most critical and crucial construction jobs today. Ask for records that show the facts . . . SULLIVAN MACHINERY COMPANY, Michigan City, Indiana. *In Canada:* Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

BRANCH OFFICES

BIRMINGHAM, ALA.	619 N. 10th St.
BOSTON, MASS.	104 Brookline Ave.
BUTTE, MONT.	24 W. Granite St.
CHICAGO, ILL.	307 N. Michigan Ave.
CLAREMONT, N. H.	1938 Main St.
DALLAS, TEX.	1914 Commerce St.
DENVER, COLO.	1815 California St.
DULUTH, MINN.	1 East Michigan St.
EL PASO, TEX.	117 North Kansas St.
HUNTINGTON, W. VA.	728 - 8th Ave.
KNOXVILLE, TENN.	201 Medical Arts Bldg.
LOS ANGELES, CALIF.	2900 Santa Fe Ave.
MIDDLESBORO, KY.	501 No. 19th St.
NEW YORK CITY, N. Y.	30 Church St.
PITTSBURGH, PA.	47 Terminal Way, So. Side
PORTLAND, ORE.	1631 N. W. Thurman St.
SALT LAKE CITY, UTAH	117 W. 2nd South St.
SAN FRANCISCO, CALIF.	145 Tenth St.
SEATTLE, WASH.	3410 First Ave. South
ST. LOUIS, MO.	2639 Locust St.
WASHINGTON, D. C.	1427 I St., N. W.

New K-81 Buster

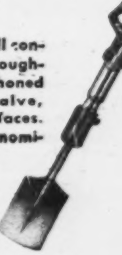
For those *tough* jobs. Weighs 75 lbs. Longlife, long stroke piston. Rugged alloy steels, reinforced construction, integral lubrication make K-81 extremely dependable. Designed for easiest operation and servicing, fewest interruptions.

L-57 Rock Drill

A faster, more durable Drill. Faster footage with less wear. Dual valve construction gives more powerful drilling and strong rotation. Runners actually *prefer* L-57. Economical of air. Requires fewer repairs. Easier to service.

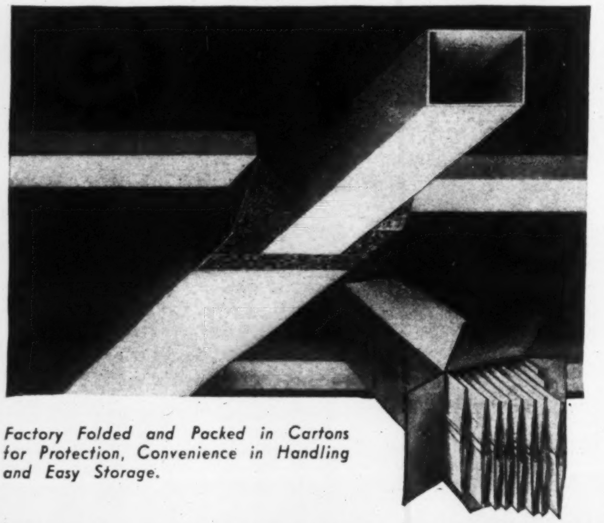
Spader

Has Sullivan Rock Drill construction quality throughout. High efficiency honed cylinders. Dual valve, oversize bearing surfaces. Rugged, sturdy, economical, dependable.



SULLIVAN

CONTRACTORS EQUIPMENT PROVED THE WORLD OVER



Factory Folded and Packed in Cartons for Protection, Convenience in Handling and Easy Storage.

ENGINEERS—ARCHITECTS—CONTRACTORS

Will Help Solve Your Metal Shortage Problems.
The New Sal-Mo Non-Metallic Supply Duct

This new non-metallic conduit saves metal in constructing supply and return duct lines of warm air heating, air conditioning and ventilating systems. It permits many installations that would otherwise be impossible because of the shortage in critical metals.

Sal-Mo Supply Duct assures a safe, insulated, fuel-saving duct system. It has been checked by leading independent laboratories and proved to possess a wide margin of safety.

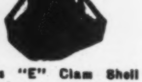
Factory fabricated and packaged in cartons there is no waste space in shipping or storing. It is most economical and convenient to handle.

S S D (Sal-Mo Supply Duct) is also furnished in sheets for fabrication of ducts or insulation.

NO SHORTAGE—Available in any quantity and in a complete range of sizes for domestic and industrial requirements.

SALL MOUNTAIN COMPANY
176 West Adams St. DEPT. H CHICAGO, ILLINOIS

Hayward Buckets



Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 48-50 Church St., N. Y.

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS

Write for descriptive catalogs
McKIERNAN-TERRY CORP.
13 Park Row, New York

forestry principles in their harvesting, and not cut timber which does not meet minimum specifications for size.

No trees would be cut for pulpwood unless producing at least two 100-inch long sticks, with minimum stump diameters of seven or eight inches. White and Norway pine in aspen and birch forests would be preserved by not cutting if seed trees would be used up. Northern hardwood and hemlock, used largely for car stakes and mining timbers, would be conserved by thinning young stands of trees only for this purpose.

Wisconsin has more than 16,000,000,000 board feet of saw timber, with at least 6,000,000 cords of pulpwood in its timber stands. Since little of it is in state, county or national forests, its cutting cannot be controlled by the state.

• • •

Building Exits Code Books Now Available

The American Standards Association has approved as an American Standard (ASA No.: A9.1-1942) the seventh edition, 1942, of the Building Exits Code, developed under the leadership of the National Fire Protection Association. Both engineering and occupancy egress requirements are fully detailed in the code. Those under the first heading include: stairs and stair enclosures, outside stairs (fire escapes), ramps, horizontal exits, doors, aisles and corridors, elevators, escalators, slide escapes, alarm systems, fire exit drills and signs and lighting.

Occupancy egress requirements specified in the code include, in addition to general requirements, those for schools, department stores, factories; hospitals, sanitariums and corrective institutions; places of public assembly, hotels and apartment houses, and office buildings. The 112-page book, fully indexed, is priced at $1.00 per copy. A review copy of this Standard is available on request.

• • •

Letter Symbols for Mechanics of Solid Bodies

An American Standard governing letter symbols for mechanics of solid bodies has been approved and published by the American Standards

If it's Rock you're Hauling

KOEHRING DUMPTORS ARE YOUR BEST BET

Here is good pictorial proof that Koehring Dumptors can haul and dump rock of any reasonable size and come speeding back for more. Wide body opening means easy loading, and gravity dumping is instantaneous. The massive chassis easily withstands the shock of constant heavy duty service. Koehring Dumptors will save you valuable time too, with three speeds in either direction, quick load spotting and dumping up to the edge of the fill. Haul rock faster with a Koehring Dumptor.

KOEHRING COMPANY • *Milwaukee, Wis.*

Your Koehring Dumptor will last much longer with proper lubrication and care . . . depend on your Koehring equipment distributor and use genuine Koehring parts.

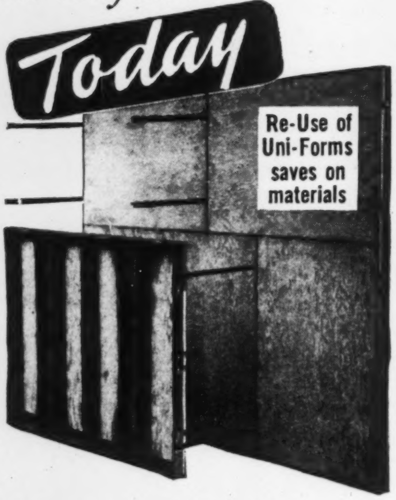
KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

In the concrete
world of
Tomorrow
Universal

PRODUCTS

will be important for concrete construction as they are



Conservatively Speaking . . .

1 Square Foot of Uni-Forms Replaces 300 Board Feet of Lumber Used in Form Building

The importance of material . . . and time . . . saving which is effected by the use of Uni-Forms was never more important than now. Find out about how Uni-Forms can work for you on our rental plan—with generous purchase option.

Write For Catalog No. 604

Which gives full technical and use details on Uni-Forms.

Universal Form Clamp Co.
CHICAGO
Branches and distributors in all principal cities

Association. 29 West 39th St., New York City. In addition to the 68 letter symbols approved to indicate such concepts as angular acceleration, circular frequency, factor of safety, normal strain, wave length, and the like, the new standard cites general principles of letter symbol standardization governing manuscripts, subscripts, superscripts, unlisted magnitudes and typography.

The new standard was prepared by the ASA Sectional Committee on Letter Symbols and Abbreviations for Science and Engineering, under the joint technical leadership of the following organizations: the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the Society for the Promotion of Engineering Education and the American Society of Mechanical Engineers.

• • •

Commercial Standards for China Plumbing Fixtures

Commercial Standard CS20-42, recently released, records the latest standards for vitreous china plumbing fixtures such as water-closet bowls, tanks, lavatories, urinals, and service sinks regularly available under adequate competition. This third edition of the standard covers several additional items, including blow-out and siphon jet wall hanging water-closet bowls, wall-hanging wash-out urinals, as well as a new boiling test, a new crazing test, and a new flushing test for water-closet bowls.

The chief purposes of the voluntary standard are to provide a better basis of understanding between buyer and seller as to grades, requirements for dimensional interchangeability, sanitation, methods of inspection, and marking of these important parts of modern plumbing systems. In addition to the manufacturers and distributors, this recorded standard of the industry is of primary interest to master plumbers, architects, engineers and builders.

The revised standard became effective for new production on July 10, 1942. Copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 10 cents.

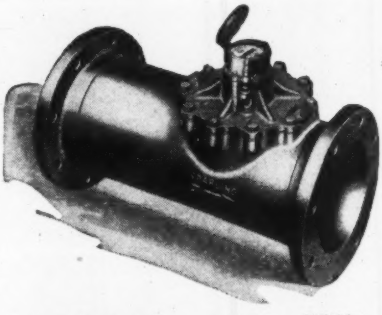
DIAGONAL
RECTANGULAR
SUPER SAFETY
T-TRI-LOCK

Specify
TRI-LOK

OPEN STEEL FLOORING • SAFETY STEPS
CONCRETE ARMORING T. TRI-LOK

DRAVO CORPORATION
300 PENN AVENUE, PITTSBURGH, PA.
REPRESENTATIVES IN PRINCIPAL CITIES

Full descriptive catalog of Tri-lok Grating, Safety Treads and other products on request.



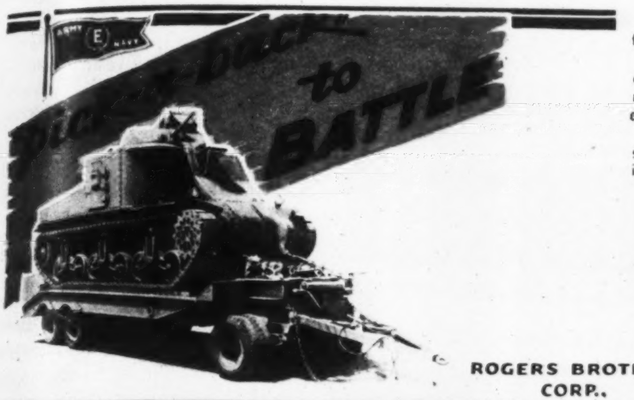
ACCURACY Within 2 Per Cent
GUARANTEED . . .

SPARLING MAIN-LINE METERS assure consistent accuracy over a wide range of flows, with the lowest loss of head. They slip into the line like a length of the pipe itself.

Bulletin No. 308 will be sent upon request

SPARLING

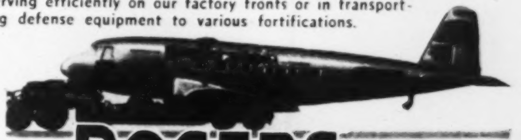
Box 3277 Terminal Annex........LOS ANGELES
3104 Michigan Avenue..............CHICAGO
622 Broadway....................CINCINNATI
101 Park Avenue....................NEW YORK
6 Beacon Street........................BOSTON



Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers, or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.



ROGERS BROTHERS
CORP.,
ALBION, PENNA.

ROGERS
LOW BED-
-HEAVY DUTY
TRAILERS

FIR-TEX ***Absorptive Form Liner***

Produces Smoother, Harder Denser Concrete on

COTTAGE GROVE DAM in Oregon

FIR-TEX Absorptive Concrete Form Liner is a highly absorptive felted board, with a chemically treated surface which resists bonding.

The mechanical vibration of concrete increases the tendency of air and water bubbles to float to the surface and to the face of the mass. When a non-absorptive form liner is employed, these bubbles have no avenue of escape and consequently remain to become voids in the face of the concrete.

The action of the Fir-Tex Liner is like that of a vacuum cleaner. It absorbs all excess air and water adjacent to surface. The removal of bubbles permits the cement to flow into those spaces so that this surface sets solidly into a smooth attractively textured mass of extreme density and resistance to moisture. This structural change in the concrete extends to a depth of about 1¼ inches from the face. Not only has the structure been given architectural beauty, but its weather resistance has been so greatly increased that eminent engineers have referred to its surface as "case hardened".

Cottage Grove Dam on coast fork of Willamette River in Oregon. Concrete poured against Fir-Tex Absorptive Form Liner.

SEE OUR CATALOG IN SWEET'S
See section 3

SEND FOR TECHNICAL BULLETIN

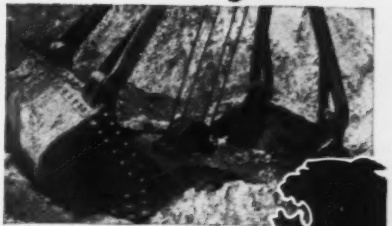
FIR-TEX Mail for free copy of technical bulletin giving full data on the Fir-Tex Absorptive Form Liner. Mail to:
FIR-TEX, Porter Building, Portland, Oregon. ER-N-42

Name ____________________
Address ____________________ (use margin)

Convoys & Counterweights

CONVOYING ships act as buffers to protect vital cargoes from destruction by enemy forces. Owen counterweights divert material being handled away from sheaves and cables, assuring that the buckets will "come through" with capacity loads for the longest possible period of service.

THE OWEN BUCKET COMPANY
6010 BREAKWATER AVE. CLEVELAND, OHIO
Branches: New York, Chicago, Philadelphia, Berkeley, Cal.



OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

Amsco Dredge Pumps Producing Aggregates for T. V. A.'s Big Dams

The Tennessee Valley Authority, originally a long range program, has had heavy, urgent demands made upon its hydro-electric power resources because of the war. New aluminum, magnesium and chemical plants will require current in excess of present production.

To meet these requirements, several projected dams are being rushed to completion, notably the Apalachia and Ocoee Dams.

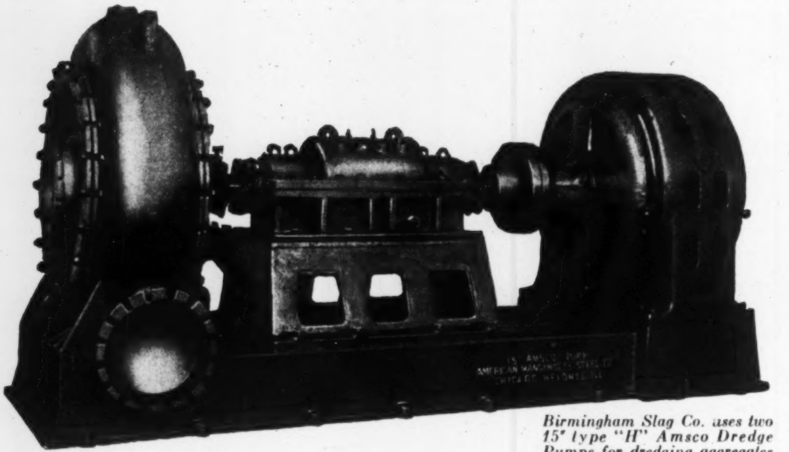
To supply sand and gravel for concrete aggregates, the Birmingham Slag Company uses two 15" Amsco type "H" heavy duty Dredge Pumps. They are powered by 400 h.p. 440 r.p.m. electric motors which receive current from diesel-generator sets.

Material is being dredged from the Tennessee River at its confluence with the Hiwassee River about 40 miles upstream from Knoxville, Tenn. All materials are pumped directly to barges which are towed to the company's modern, shore-type screening and classifying plant at Calhoun, Tenn., 20 miles up the Hiwassee. Barges are unloaded by clamshells which empty into hoppers feeding belt conveyors. After washing and sizing to specifications, processed material is shipped by railway to the dam site.

The large volume of sharp material dredged is handled with minimum wear by the tough manganese steel water-end parts of the Amsco Dredge Pumps used.

Besides helping these projects to rapid completion, the Amsco Pumps are saving metal, in that water-end parts less shock and abrasion resistant would have to be replaced more frequently.

A bulletin is available completely describing Amsco Dredge Pumps of standard and Counterflow design, and dredge cutterheads, piping valves and fittings.



Birmingham Slag Co. uses two 15" type "H" Amsco Dredge Pumps for dredging aggregates from Tennessee River for construction of T.V.A. Dams.

Amsco

AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Genuine Manganese Steel, "The Toughest Steel Known"
Chromium-Nickel Alloy Castings for heat and corrosion
Power Shovel Dippers. Dredge and Industrial Pumps
Welding Materials for reclamation and hard-surfacing

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

Municipal Parking Lots Keep Streets Clear

Approximately one out of every five cities in the United States over 10,000 population now own or operate municipal parking lots mainly to clear business streets of traffic, according to the International City Managers' Association.

Most of the parking lots were established during the last two or three years. Six states in 1941 adopted legislation authorizing cities to acquire and operate parking areas, the report showed. About two-thirds of the 203 cities reporting municipally operated parking lots said they were on city-owned land; the others on land leased from private interests. In addition, 51 other cities —most of them over 100,000 population—lease city-owned land to private interests for operation of parking areas.

In about half the cities some or all of the land used for parking lots was acquired specifically for the purpose. In most of the other cities land left over from street-widening or grade-crossing projects, or sites adjacent to public buildings, were turned into parking areas.

Cities buying land for parking lot use have spent as much as $230,000, which was the initial investment of Kansas City, Kan. Several reported spending $50,000. Most cities pay for the land and improvements out of current budgets, a few have used surplus cash, and several levy special assessments.

Maintenance costs for most of the municipal parking lots are, in general, low, according to the report, since less than 15 percent of the lots reported have part-time or full-time attendants, and only half of them are equipped with night lighting. In some cities lots are attended only on Saturday or at night, or are supervised by police officers.

The cities follow an almost uniform policy in allowing free unlimited parking on the municipal lots. Of the cities charging a fee, Chicago, which levies 25c. for 24 hours of parking, showed a gross revenue of $215,000 in 1940. In Detroit, municipal parking areas are located a short distance from the business center and are operated in connection with the city-owned bus transportation system; 15c. pays for all-day parking and transportation of the car driver downtown. Several cities, including Kalamazoo and Ann Arbor, Mich., permit free parking for the first two or three hours and charge small amounts for succeeding hours. Ithaca, N. Y., charges 15c. a day, 75c. a week, or $3 a month.

In all 51 cities where municipal parking lots are operated by private interests, fees are charged parkers and the lot operators pay the city certain sums. Louisville, Ky., leases a 150-car lot to private interests, for which the city receives $1,300 a year.

. . .

$546,290,000 in 1941 Truck Taxes

Special taxes on trucks in 1941 reached a record high of $546,290,000, according to the Automobile Manufacturers Association, an increase of more than 100 percent in a decade.

How both the total taxes on trucks and the average per vehicle truck tax burden have increased since 1931 is shown in the following table compiled by the association:

Year	Total Special Taxes	Average Per Truck Registered
1931......	$227,980,000	$65.77
1932......	245,559,000	76.04
1933......	286,538,000	88.69
1934......	317,754,000	92.93
1935......	342,672,000	93.51
1936......	398,681,000	99.99
1937......	433,189,000	101.80
1938......	417,347,000	98.80
1939......	443,993,000	100.59
1940......	488,496,000	106.42
1941......	546,290,000	111.23

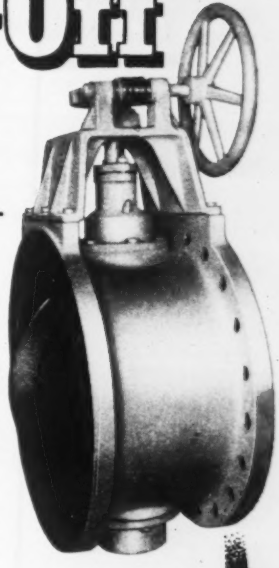
Personal property taxes on trucks in operation, income and property taxes on garages, terminals, repair shops and trucking companies are not included in the above figures.

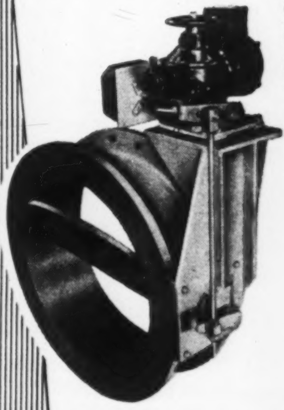
. . .

New Type Parking Meters

Two New York cities—Oswego and Fulton—have installed a new type of parking meter which does not show the amount of unexpired time remaining after insertion of the coin. This type of meter is designed to eliminate cruising by motorists seeking a meter with enough unexpired time to serve their parking needs.

The meters permit sixty minutes of parking for a penny according to the International City Managers' Association.





Simplify Shut-Off

Consider the advantages of R-S Butterfly Valves from the standpoint of installation, operation and maintenance.

The comparatively light weight and compact design of these valves effect a substantial saving in installation costs. Less space and supporting structure are required. A quick-action valve yet easily and smoothly operated. *Six hand wheel revolutions completely open the valve or close it wedge-tight.*

Can be operated by electric motor, hydraulic cylinder or combined motor and manual control for a wide range of services. Electric motor operated valve (illustrated) has a hand wheel for manual operation in case of current failure. Available in 125 pound iron, 150 and 300 pound steel. Sizes to 84-inches and pressures to 600 pounds.

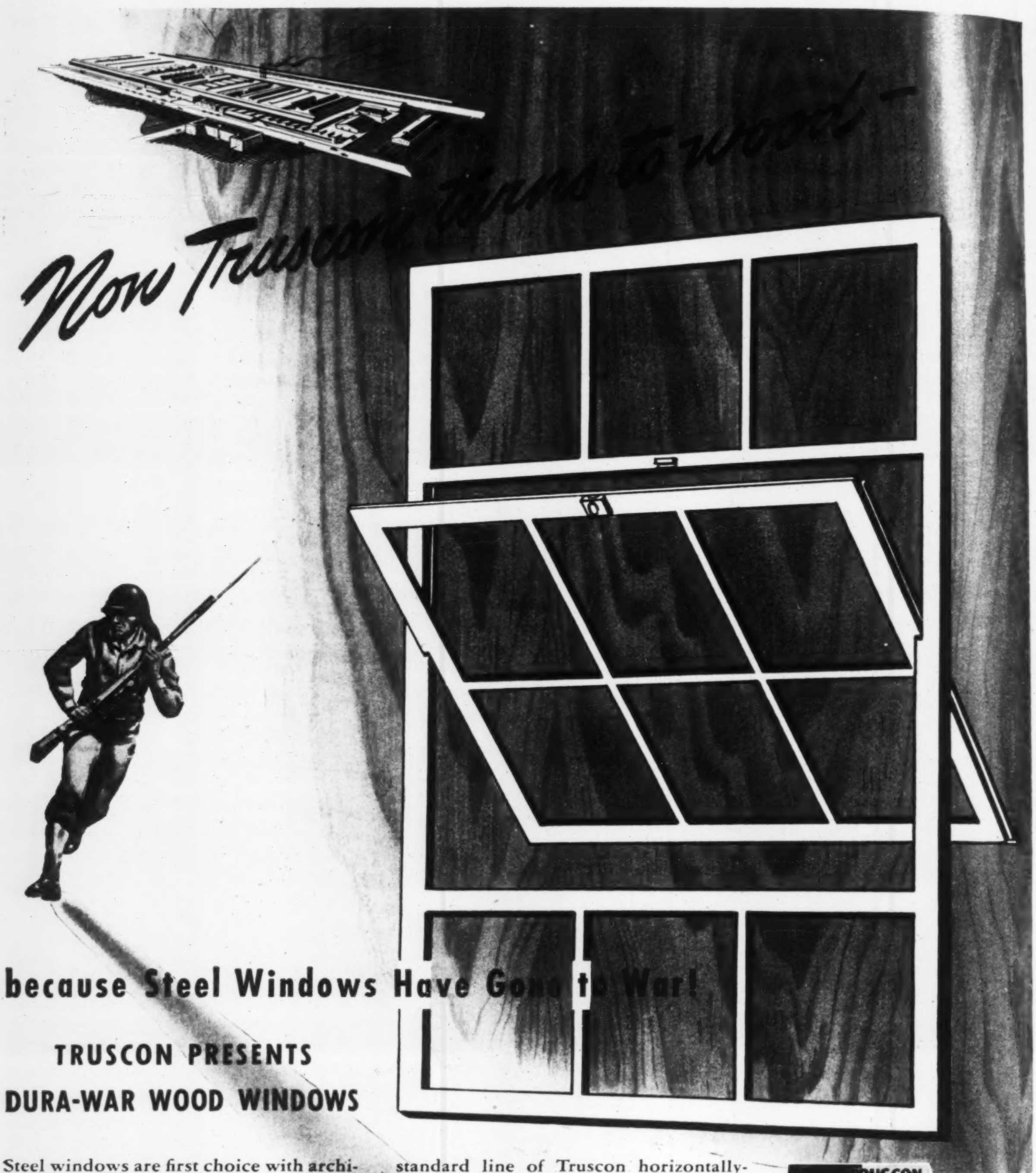
There are no right angle bends or reverse turns to collect sediment. Streamlined construction induces self-cleaning. Maintenance is no problem—constructed to last for years.

Write for Catalog No. 15-B, approximate weights and detailed dimensions.

R-S QUALITY PRODUCTS SINCE 1908

BUTTERFLY VALVE DIVISION
R-S PRODUCTS CORPORATION
116 Berkley Street • Philadelphia, Penna.

R-S *Streamlined* BUTTERFLY VALVES



Now Truscon turns to wood —

because Steel Windows Have Gone to War!

TRUSCON PRESENTS
DURA-WAR WOOD WINDOWS

Steel windows are first choice with architects because they are easily adapted to the requirements of modern factory design. But, today, with the use of steel restricted for the manufacture of windows, Truscon has applied its vast knowledge and experience to the problem of supplying a suitable alternate. The result is the DURA-WAR Wood Window.

The requirements of the industrial jobs now on your boards, and those you will plan until the end of the war, can be met fully with DURA-WAR Wood Windows. They parallel the types and sizes in the standard line of Truscon horizontally-pivoted steel windows.

Truscon trained sales engineers and erectors are available to give you all necessary DURA-WAR Wood Window information, including cost, erected and glazed, or merely delivered to job site. Prompt shipments! TRUSCON STEEL COMPANY, Youngstown, Ohio, Subsidiary of Republic Steel Corporation.

NOTE: Residential Double Hung Steel Windows and Residence Steel Casements are available for use in construction located in defense areas. The War Production Board has approved their use until existing inventories are liquidated.

TRUSCON
WINDOWS

Write today for illustrated catalog on Truscon DURA-WAR Wood Windows.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York

ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*

(Daily service also available—Write for details)

Location of ENR Correspondents

Symbols and Abbreviations Include

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges, Grade Cross'gs
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

★**Mass., Lynn**—City, Water Dpt., City Hall, preliminary plans water supply facilities, distr. mains, standpipe. **$1,035,000.** CD 12/9—ENR 12/11.

N. C., Charlotte—R. W. Flaek, city mgr., 12,380 ft. 16- to 24-in. watermains, etc. CD 5/19—ENR 5/21.

†**Pacific Northwest**—U. S. Eng., 800 3 Ave., Seattle, Wash., water distr. sys., Inv. 245.

BIDS ASKED

Bids Asked November 24

D. C., Wash.—District Comrs., District Bldg., watermains, sewers for Parkside Dwellings. $65,350.

†**Me., Portland**—Federal Works Agency, 99 Chauncy St., Boston, Mass., water pipeline, Portland Harbor. Over $15,000. Plans deposit $15

Bids Asked December 9

†**Md., Annapolis**—Anne Arundel Co. Sanitary Comn., Glenburnie, water facilities from here to Eastport, Md. 18-141 Water Contr. 15 W. **FWA.**

LOW BIDDERS

†**California**—U. S. Eng., 1209 8 St., Sacramento, Nov. 7, utilities, drilling well, etc., Spec. 264, Kings Co., from Western Well Drilling Co. Ltd., 522 W. Santa Clara St., San Jose, under **$50,000.**

†**Nevada**—U. S. Eng., 4550 Brazil St., Los Angeles, Calif., water treatment plant, Solic. 914, Nye Co., from C. J. Paradis, 2320 Idell St., Los Angeles, Calif.

†**Texas**—U. S. Eng., Fort Sam Houston, Nov. 9, pump. sta., 125,000 gal. surface water storage tank, Spec. 42-385, Bell Co., from Geo. P. O'Rourke Const. Co., 215 Nash Bldg., Austin, **$50,000-$100,000.** CD 11/2.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., gas and water distr. sys. extens., sanitary sewerage sys. extens., streets, roads and drainage, Cameron Co., from Allied Constr. Co., 4625 S. Versailles St., Dallas. CD 11/6—ENR 11/12 under WW.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Estaboga, water and sewerage sys., pump. station, treatment plant, water lines, etc., Talladega Co. to Oliver-Wilder Co., 709 Pinson Rd. and Perusini Constr. Co., Martin Bldg., both Birmingham. Est. **$250,000.** Bids 10/28.

†**New Hampshire**—U. S. Eng., Park Square Bldg., Boston, Mass., water line, Hillsboro Co., to Manchester Water Works, W. Merrimack St., Manchester. Est. under **$50,000.**

†**North Carolina**—U. S. Eng., Charlotte, construction, completion water distr. sys. and sanitary sewers, Union Co., to Boyle Constr. Co., Inc., Sumter, S. C., **$100,000-$500,000.**

†**Pennsylvania**—U. S. Eng., Standard Oil Bldg., Baltimore, Md., water distr. sys., Lebanon Co., to Herre Bros., 2250 N. 7 St., Harrisburg, under **$50,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, 100,000 gal. rein.-con. surface storage reservoir, Bexar Co., to Aiken & Hinman, Box 1659, San Antonio, under **$50,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, water storage facilities and stand-by pump. unit, Solic. 257-43-114, Bowie Co., to Dallas Foundation Co., Mullins Court, Texarkana, **$50,000-$100,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, supplementary contract underground utilities, to M. F. Fischer & Sons, Builders Exch. Bldg., San Antonio, under **$50,000.** Awarded 11/7. CD 10/19—ENR 10/22 under CA.

†**Texas**—U. S. Eng., Fort Sam Houston, supplementary contract underground utilities, Bexar Co., to Truehart, Caldwell & Lee, Bldrs. Exch. Bldg., San Antonio, under **$50,000.** Additional to 10/15 CD 10/22 ENR, under CA.

†**Tex., Garland**—J. R. Stultz, city secy., water well, Tex. 41-460, to J. L. Meyers & Son, 206 W. Commerce St., Dallas, **$27,813. FWA.** CD 8/25—ENR 8/27.

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, drilling well, Millard Co., to Roscoe Moss Co., Bountiful, under **$50,000.** Bids 10/31.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., El Cerrito — Stege Sanitary Dist., Manila and San Pablo Sts., outfall sewer main, Fairmont Ave. Over $75,000. E. K. Hussey, Syndicate Bldg., Oakland, engr.

Calif., San Pablo—San Pablo Sanitary Dist., F. Carfield, secy., Firehouse, bids soon, sewers, Assessment Dist. 15, $27,000; and Assessment Dist. 17, $51,915. No bids received Nov. 6. P. Jones, Box 1294, Richmond, engr. CD 10/27—ENR 10/29.

Conn., Stamford—Chas. E. Moore, mayor, storm sewers Magee Ave., Halloween Blvd. $29,522. L. E. Tuttle, Municipal Bldg., engr.

Mo., Fort Leonard Wood (br. St. Louis)—State Bd. Health, Jefferson City, sanitary facilities. $50,000. Applied for FWA funds.

Mo., Malden—State Bd. Health, Jefferson City, sanitary facilities. $41,000. Applied for FWA funds.

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, sewers in Bath, 25 and 26 Aves., Bay 37, Bay 38, Bay 40, Bay 41, Bay 43 and Bay 44 Sts. $235,000.

Tex., Port Neches—State Health Dpt., c/o Dr. G. W. Cox, Austin, sanitation facilities. $25,100. Applied to FWA. Shingle & Scott, Littlefield Bldg., Austin, engrs. CD 11/5—ENR 11/12.

Wis., Lena—L. L. Netzer, town clk., voted bonds sewage treatment plant $40,000. Foth & Boyd, Columbus Bldg., Green Bay, engr. CD 7/29—ENR 8/6.

BIDS ASKED

Bids Asked November 27

†**O., Massillon**—Pub. Bldgs Admin., North Interior Bldg., Wash., D. C., storm water drainage. **FWA.**

Bids Asked December 1

†**La., Pineville**—R. C. Lawrence, mayor, City Hall Bldg., exten. sewer mains, Unit 3, sewer and water imprvs., Docket La-129. **FWA.** H. B. L'Heureaux, 915 6 St., Alexandria, engr. CD 10/9/41—ENR 10/16/41.

Bids Asked

†**Massachustts**—U. S. Eng., Park Square Bldg., Boston, (selected list bidders) sewerage sys., No. 175-43-EG 148, Plymouth Co.

Massachusetts—Bethelhem-Hingham Shipyards, Inc., E. Howard St., Quincy, (from selected bidders) 1 story, 35x55 ft. cinder block incinerators, 24 ft. high.

LOW BIDDERS

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, sewage treatment plant, from Osage Eng. Co., 1413 S. Blackwelder St., Oklahoma City, **$50,000-$100,000;** outside electrical distr. sys., from Mound City Electrical Eng. Co., 957 St. Louis St., Springfield, Mo., **$50,000-$100,000,** both Solic. 957-Neg-43-100, Woodward Co.

CONTRACTS AWARDED

★†**Ala., Mobile**—City, exten. sewer, **FWA** 1-185, to Carey W George & Assoc., Mobile, **$960,276.** CD 10/16—ENR 10/22 under LB.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, 5 ton incinerator, Monterey Co., to Harold C. Geyer, 787 Munras Ave., Monterey. Awarded 11/10.

Calif., Benicia—Sewers, to Phil Jones, Box 1299, Vallejo, **$81,569.**

†**Kan., Kansas City**—H. Payne, city clk., sewers, Proj. 14-184, to Brown Bros. Constr. Co., 24 and Steele Rd., **$147,000. FWA.** Bids 11/5. CD 3/11.

†**Ohio**—U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, incinerator, Franklin Co., to Ohio State Constr. Co., 22 E. Gay St., Columbus, under **$50,000.**

†**Pennsylvania** — U. S. Eng., Standard Oil Bldg., Baltimore, Md., sewers, Lebanon Co., to Herre Bros., 2250 N. 7 St., Harrisburg, under **$50,000.**

†**S. C. North Charleston** — Federal Works Agency, Candler Bldg., Atlanta, Ga., sewerage sys., to Simons-Mayrant Co., 16 Broad St., Charleston, **$40,464.** Awarded 11/7. CD 9/4—ENR 9/10.

†**Texas** — U. S. Eng., Fort Sam Houston, sewage disposal plant, Bexar Co., to Aiken & Hinman, Box 1659, San Antonio, under **$50,000.**

†**Texas**—U. S. Eng., Citizens Bank Bldg., Denison, sewage treatment plant, Bowie Co., to Dallas Foundation Co., c/o Mullins Court, Texarkana, under **$50,000.**

†**Texas**—U. S. Eng., Albuquerque, N. M., outfall sewer, El Paso Co., to R. H. Fulton & Co., Lubbock, under **$50,000.**

Tex., Houston—V. A. Pickett, mayor, sanitary sewers, Findlay St., to S. W. Thompson, 517 N. Sidney St., **$82,178.** Bids 11/2. CD 10/29.

†**Wisconsin**—U. S. Eng., Cudahy, sanitary sewerage sys. and water distr. sys., Milwaukee Co., to W. J. Lazynski, Inc., 802 Centre St., Milwaukee, under **$50,000.**

Wis., West Bend—K. H. Weiss, city clk., sewage treatment plant addn., concrete digestion tanks, sludge drying beds, piping, to Hron Bros. Co., Inc., 213 N. Main St. Awarded 11/9. Suhr, Berryman, Peterson & Suhr, Inc., 130 N. Wells St., Chicago, Ill., engrs.

BRIDGES, GRADE CROSSINGS

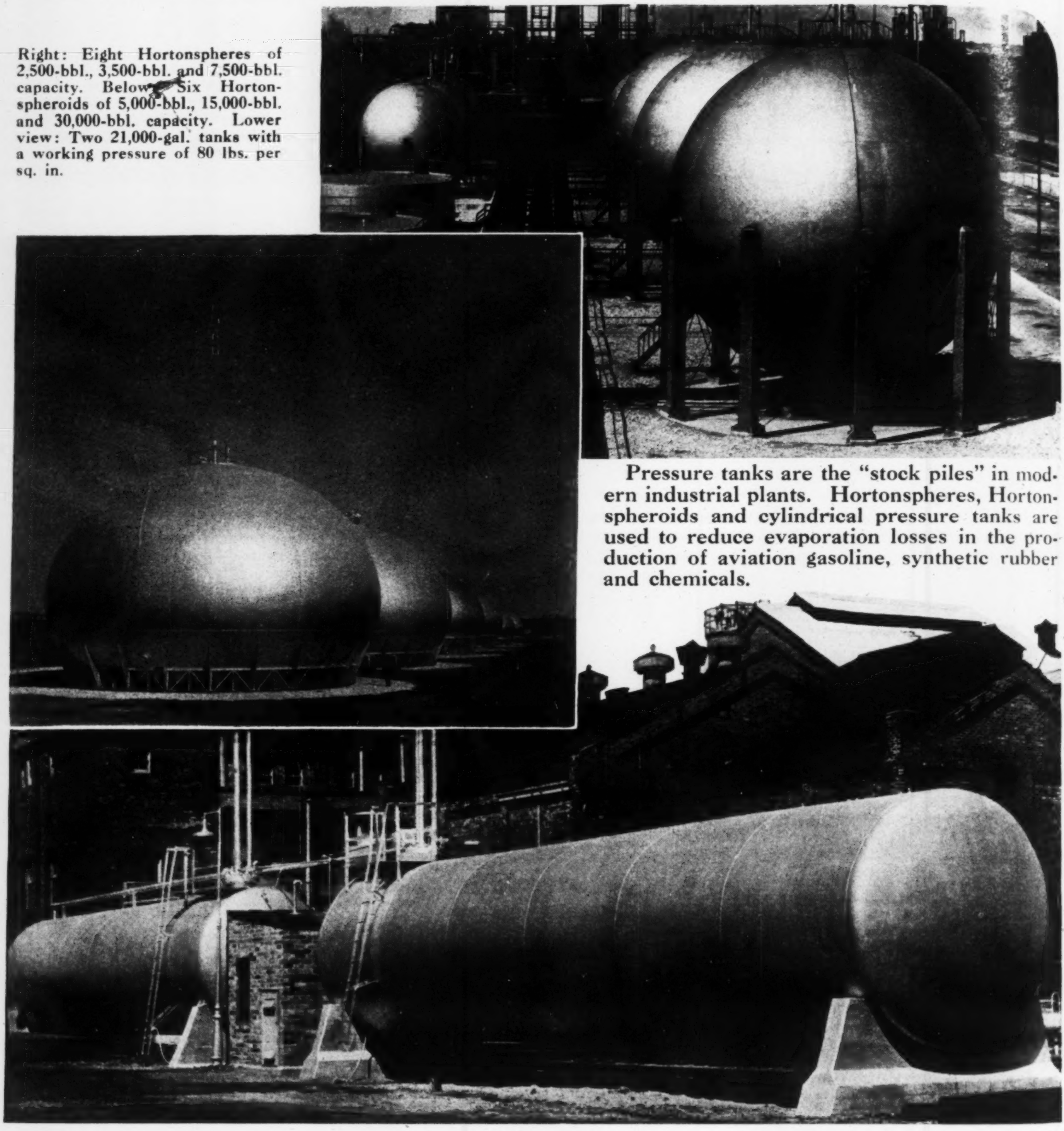
PROPOSED WORK

Illinois—State Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, 3 bridges, incl. 1 over Grassy Creek, Sect. 35B, Williamson Co.; two 50 ft., two 67 ft. and one 68 ft. con-

PRESSURE STORAGE TANKS

..."Production Line" for Liquids and Gases

Right: Eight Hortonspheres of 2,500-bbl., 3,500-bbl. and 7,500-bbl. capacity. Below: Six Hortonspheroids of 5,000-bbl., 15,000-bbl. and 30,000-bbl. capacity. Lower view: Two 21,000-gal. tanks with a working pressure of 80 lbs. per sq. in.



Pressure tanks are the "stock piles" in modern industrial plants. Hortonspheres, Hortonspheroids and cylindrical pressure tanks are used to reduce evaporation losses in the production of aviation gasoline, synthetic rubber and chemicals.

CHICAGO BRIDGE & IRON COMPANY

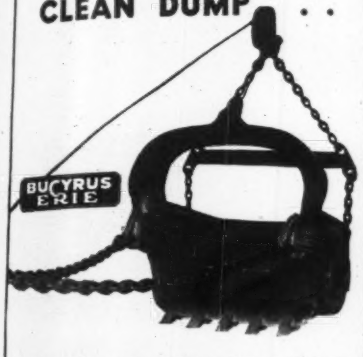
Chicago................2101 McCormick Bldg.
New York...........3311-165 Broadway Bldg.
Cleveland................2201 Guildhall Bldg.

Philadelphia....1623-"1700" Walnut St. Bldg.
Tulsa.......................1617 Hunt Bldg.
Birmingham........1520 North Fiftieth Street

Washington.................330 Bowen Bldg.
Houston...................5609 Clinton Drive
San Francisco..............1020 Rialto Bldg.

Plants in BIRMINGHAM, CHICAGO, and GREENVILLE, PENNA. **In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.**

QUICK FILL . . . . .
SMOOTH CARRY .
CLEAN DUMP . .



That's why RED ARCH Buckets will give you faster dragline operation, bigger output to meet wartime demands. These modern buckets add to your production because they are:

1. Scientifically designed on the basis of 62 years' experience. 2. Manufactured from tough, light special alloy-steels. 3. Fitted with famous Beco Tiger Teeth—easily replaceable, reversible and renewable. 4. Equipped with the new, strong, butt welded Red Arch chain.

Capacities from 3/8 to 14-yards; light, medium and heavy duty types. Step up your output with Red Arch Buckets!

BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WIS., U. S. A.

Compact! Powerful! Safe!

DISTRIBUTABLE CONTROLLED POWER

with Beebe Bros ALL STEEL HAND HOIST
SEATTLE, U.S.A.
TRADE MARK REGISTERED

★

Money Has Been Saved on These Jobs

1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9-5-Ton Beebes, three lines to each hoist through blocks.
Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.
Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

★

When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

BEEBE BROS., 2720 6th Ave. S., Seattle, U.S.A.

★

"THE STRONGEST GEARED POWER
FOR ITS WEIGHT IN THE WORLD"

BRIDGES, etc. (Proposed Work, Cont'd.)

tinuous deck bridge over Kickapoo Creek, Logan Co.; 42 ft. concrete deck girder bridge over Piles Fork, two 45 ft., one 58 ft. I-beam bridge, also two 77 ft. and one 100 ft. span bridge, both over Crab Creek on SBI Route 13, Sect. 5B-2; two 45 ft. and one 58 ft. I-beam bridge over Big Muddy River and Mud Creek, all Jackson Co.; 1 steel truss main bridge and 3 overflow bridges over Kaskaskia River, Route 150, Sect. 421B, St. Clair Co. W. W. Polk, ch. engr.

BIDS ASKED

Minnesota—State Hy. Dpt., St. Paul, removing Bridge 4260 over main channel Mississippi River, S. P. 8510-05 (Trunk Hy. 53-75) FAP 912-A, at Winona, Winona Co. E. J. Miller, state bridge engr.

†Kentucky—Tennessee Valley Auth., Knoxville, Tenn., raising 2 bridges in Kentucky Reservoir area, Proj. 8-1080.

South Carolina—South Carolina Pub. Serv. Auth., at office C. H. Gerald, secy., 1246 Main St., Columbia, removal timber trestle on Atlantic Coast Line R. R., Docket No. 4329-P-R.

LOW BIDDERS

California—State Div. Hys., Los Angeles, Nov. 5, widening bridge, San Diego Co., from Contracting Engineers Co., 2310½ W. Vernon Ave., Los Angeles, **$41,945.** CD 10/16—ENR 10/22.

★**Georgia**—State Hy. Dpt., W. E. Wilburn, chn., Atlanta, Nov. 10, bridge, McIntosh Co., from Scott Constr. Co., Thomasville, **$990,634;** steel, from Nashville Bridge Co., 2100 18 Ave. N., Bessemer, Ala., **$98,840.** CD 10/27—ENR 10/29.

Washington—State Hy. Dpt., Olympia, Nov. 10, steel girder bridge, Clallam Co., from M. P. Butler, 3419 13 Ave. S.W., Seattle, **$52,614.** CD 10/27—ENR 10/29.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. P. Wks., City Hall, structural and ramp lighting, new Aliso St. Viaduct, to Pacific Union Marbelite Co., 3248 Long Beach Blvd. E. **$30,142.** Awarded 11/9. L. Aldrich, City Hall, engr.

N. J., Newark and **Harrison**—Bd. Freeholders Essex and Hudson Counties, Hall of Records, Newark, reconstructing westerly abutment Clay St. Bridge over Passaic River, to Stillman, Delehanty & Ferris Co., 1 Montgomery St., Jersey City, **$75,000** plus. Wm. Stickel, Hall of Records, engr.

STREETS AND ROADS

BIDS ASKED

Bids Asked November 24

West Virginia—State Rd. Comn., D. McClaugherty, secy., Charleston, grading, concrete paving, widening, traffic bound gravel surfacing 0.288 mi. U. S. Route 21 to Demuth Glass Wks. Rd., Wood Co.; grading, draining 0.537 mi. Pineville Relocation, S. P. 3585-C, Wyoming Co.

★**Ohio**—State Hy. Dpt., Columbus, grading, draining, concrete paving, waterbound macadam surface widening, continuous laminated creosoted timber slab bridge, concrete substructure, roadside imprv. 7.933 mi. Sects. B and C of SH 291, Huron Co., $653,600; grading, draining, concrete paving, concrete slab bridge, 2 timber bridges, roadside imprv., etc. 5.181 mi. Sects. O, P, G, N, N-1 and N-2 of SH 291, Lorain and Medina Counties, $558,000; grading, draining, hot mix hot laid asphaltic concrete paving 0.171 mi. E. 5 Ave. approach to SH 655, Franklin Co., $22,400; grading, concrete widening 4.305 mi. Sects. Coalton, K-2 and Wellston of SH 396, Jackson Co., $62,200; grading, draining, concrete paving, roadside imprv. 1.252 mi. Sect. A of SH827, Lorain Co., $113,300; grading, draining, concrete paving, continuous concrete beam bridge, concrete substructure over West Branch Black River and continuous concrete beam bridge concrete substructure over Charlemont Creek on 1.079 mi. Sects. E and F of SH 291, Lorain Co., $231,000; aggregate treating 9.229 mi. Sects. B and C of SH 882, Morgan Co., $6,260.

Bids Asked November 25

Pennsylvania—At office I. L. Hughes, secy. Hys., Harrisburg, concrete paving, 3 concrete structures, timber, concrete, steel viaduct, draining 2,684 ft. Franklin Ave., Erie, Lawrence Park Twp., Erie Co.; concrete paving, rein.-con. bridge 335 ft. Legislative Route 6, Sect. 14, Traffic R-6; concrete paving, rein.-con. bridge 1,035 ft., Legislative Route R-7, Sect. 7, Legislative Route 63029 Traffice R-6, both Honesdale Borough, concrete paving, rein.-con. bridge, 3,132 ft. Legislative Route-7, Sect. 8, Legislative Route-63022, Traffic R-6, Hawley Borough, Palmyra Twp., all foregoing Wayne Co.

Bids Asked

Utah—State Road Comn., Salt Lake City, received no bids Nov. 4, imprv. 33.3 mil. hy.,

LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe

100 LBS.
LEADITE
CEMENT
FOR JOINTING WATER MAINS
MANUFACTURED BY
THE LEADITE COMPANY
PHILADELPHIA, PA.

A BAGFUL

OF PIPE JOINTING SATISFACTION

A long familiar sight to Water Works Men, the contents of thousands of these sacks have jointed more miles of c.i. bell and spigot pipe than any other melted, self-caulking jointing material.

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia, Pa.

No Caulking

MORETRENCH WELLPOINT SYSTEMS

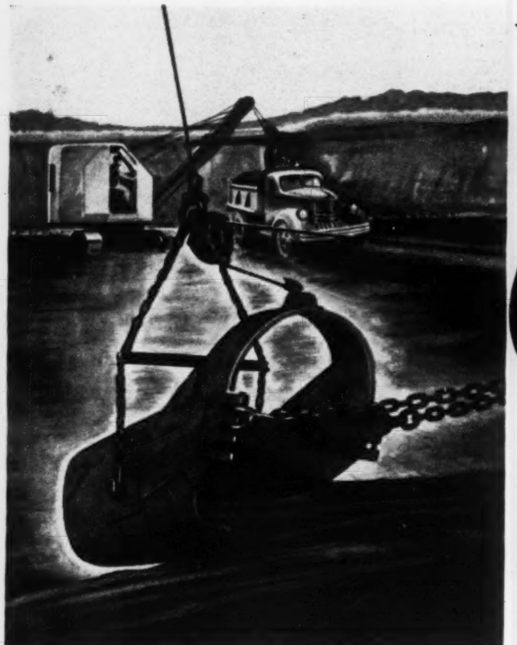
Guarantee
DRY EXCAVATION

•

HOW
ENGINEERING ABILITY
EFFICIENT EQUIPMENT
EXPERIENCED DEMONSTRATORS

Catalog on request

MORETRENCH CORPORATION
90 West St., New York, N.Y.
Rockaway, N. J. • Joliet, Ill.
New Orleans, La.



SHE'S A DIGGIN' FUEL!

Coal production is a vital factor in our drive for Victory. Ample supplies of fuel must be provided to keep the machinery of War Production moving.

In outstanding strip mines everywhere, you'll find Page AUTOMATIC Dragline Buckets digging-in . . . speeding the handling of the overburden . . . uncovering America's vast coal resources.

By using ALL the weight for digging, PAGE Buckets will even dig shales and materials formerly requiring blasting. Because they are so shaped, designed and balanced that they AUTOMATICALLY land ready to DIG AT ANY DEPTH and use all the bucket weight for digging, Page AUTOMATIC Dragline Buckets have the reputation of out-digging other buckets of equal size and weight.

PAGE ENGINEERING COMPANY · CHICAGO, ILL.

BOOST PRODUCTION

PAGE *Automatic* DRAGLINE BUCKETS

KEEP AMERICA STRONG

COMPLETE WELL POINT SYSTEMS

IMMEDIATE STOCK SHIPMENTS
Rentals or Sales

19 YEARS of Loyal Service to the Construction Industry is our "Best Sales Talk"

ORGANIZATION • EXPERIENCE • RESPONSIBILITY

Serviced and Sold by One of the Largest Organizations of Its Kind

COMPLETE
Machinery & Equipment Co., Inc.
MAIN OFFICE AND PLANT
LONG ISLAND CITY, N. Y.
Phone Ironsides 6-8600.
Branch Warehouse: Gary, Ind. Office: 125-168 St., Hazelcrest, Ill. Phone: Harvey 2912

STREETS, etc. (Bids Asked, [illegible]) Tooele Co. J. S. Evans, Salt Lake City, ch. engr. CD 10/27.

★**Florida**—State Road Dpt., Tallahassee, rejected bids Oct. 29, imprv. roads Hillsborough, Lake, Orange and [illegible] Counties. CD 11/5—ENR 11/12 under L[illegible]

North Carolina—State Hy. & P. Wks. Comn., Raleigh, rejected bids [illegible] imprv. 2.69 mi. Wayne Co. New bids soon. CD 11/10—ENR 11/12 under LB.

LOW BIDDERS

California—State Div. Hys., P. Wks. Bldg., Sacramento, Nov. 12, imprv. [illegible] Kings Co., from W. C. Railing, 27 Lowell St., Redwood City, **$159,145*****16.1 mi. [illegible] and Los Angeles Counties, from Griffith [illegible] Los Angeles Ry. Bldg., Los Angeles, $141,168*** 2.24 mi. San Joaquin Co., from [illegible] Biasotti & Son, 40 W. Clay St., Stockton, $78,686. CD 10/23—ENR 10/29.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, road [illegible] paving, draining warehouse area, Marin Co., to Peter Sorenson, 927 Arguello St., Redwood City. Awarded 11/13.

Connecticut—W. J. Cox, comr. State Hy. Dpt., Hartford, Nov. 12, 2,457 ft. paving Middletown, from D. Arrigoni, 605 Main St., Middletown, **$31,968.** CD 11/6.

D. C., Wash.—District Comrs., District Bldg., Nov. 12, imprv. roadway, South Capitol St., Howard Rd. to Portland St., from Wilmoth Paving Co., 1 and T Sts. S.W., **$80,973.**

Illinois—Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, Nov. 6, imprv. 1.94 mi. FA Route 155, Sect. 1-XG, Greene Co., from J. P. Wetherby Constr. Co., Ottawa, $27,818. W. W. Polk, ch. state hy. engr.

Ill., Chicago—Cook Co., Nov. 9, imprv. 7,798 ft. Happ Rd. from Willow Rd. to Sunset Ridge Rd., Northfield Twp., and 3,726 ft. Happ Rd. from Illinois Rd. to Winnetka Ave., New Trier Twp., from Standard Paving Co., 30 N. La Salle St., **$59,793** and **$24,961** respectively.

Maryland—State Road Comn., Baltimore, Nov. 10, imprv. 2.703 mi. Anne Arundel Co., from C. J. Langenfelder & Son, Rosedale, **$320,817.** CD 11/4.

Md., Upper Marlboro—Comrs. Prince George Co., Nov. 6, street paving, from Wilmoth Paving Co., 60 P St. S.E., Wash., D. C., $71,600.

Michigan—State Hy. Dpt., Lansing, Oct. 28, grading, concrete paving 1.515 mi. DA-WR-17-56C-1, Chippewa Co., from Bacco Constr. Co., Commercial Bank Bldg., Iron Mountain, **$163,185.**

Michigan—State Hy. Dpt., Lansing, Nov. 5, grading, concrete paving 2.027 mi. DA-WC-50-44C-1 on Hall Rd. from U.S. 25 east to M-29, Macomb Co., from Denton Constr. Co., 7-170 General Motors Bldg., Detroit, **$148,928;** 0.754 mi. DA-WI-41-74C-1, Kent Co., from P. Vanderveen & Sons, 259 Diamond Ave. S.E., Grand Rapids, **$37,140.**

Pennsylvania—I. L. Hughes, secy. Dpt. Hys., Harrisburg, Nov. 6, imprv. 1,684 ft. Greene Co., from Chas. Balazick, Jefferson, **$78,277;** 3,076 ft. Dauphin Co., from Hempt Bros., R.D. 1, Camp Hill, **$160,483.** CD 10/27—ENR 10/29.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Gadsden, clearing, grubbing, grading, base course paving, Etowah Co., to C. G. Kershaw Contg. Co., 2214-20 Ave. S., Birmingham. Est. **$250,000.**

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, paving roads, Inv. NEG-JAX-43-321, Orange Co., to Hubbard Constr. Co., Orlando, less than **$100,000.**

†**Idaho**—U. S. Eng., Pittock Blk., Portland, Ore., roads and water sys., Ada Co., to J. Nottingham, 2323 Regan Ave., Boise, over **$50,000.** Awarded 10/30.

Ill., Peoria—Imprv. 1.0293 mi. Sect. 12-A-2-CS, to Andrew Biehl, 209 Henssler Pl., **$35,178.** Bids 10/13, awarded 11/6. CD 10/6—ENR 10/8.

†**Kansas**—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., grading, building, paving roads, streets, Pratt Co., to N. R. Sanford, Hoisington, **$50,000-$100,000.**

†**Louisiana**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., roads, parking areas, Ouachita Parish, to T. L. James & Co. Inc., Ruston, under **$50,000.**

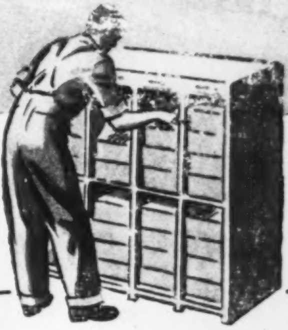
★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, paving approach slabs to doors of bldg., Alpena Co., to W. H. Knapp, Alpena, less than **$1,000,000.**

†**Missouri**—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, surfacing, grading, drainage, St. Louis Co., to Cameron, Joyce & Co., Keokuk, Ia., **$100,000-$500,000.**

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., roads, sewerage sys., catch basins, drains, etc., Hudson Co., to Calacurcio Contg. Co., 40 Journal Square, Jersey City, under **$50,000.**

★**New Mexico**—B. G. Dwyre, engr. State Hy. Dpt., Santa Fe, imprv. 0.43 mi. Sierra Co.,

"Store welding electrodes in a dry place — they will keep indefinitely if properly cared for"



Always keep electrodes in a dry place — on a clean shelf or rack, or at least off the floor. Don't expose them to moisture, keep them away from sweating pipes and open windows. If by accident a box of electrodes should get wet, spread them out to dry immediately.

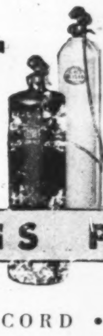
Follow these simple precautions together with those enumerated at the right — fight waste to speed victory.

A booklet of shop bulletins illustrating "do's" and "dont's" has been prepared to help your welding operators get the most out of every electrode. We'll gladly send you as many copies as you can use.

WELDING ELECTRODES ARE SCARCE

Help Prevent Waste

- Do not bend electrodes unless absolutely necessary
- Use electrodes down to a 2-inch stub
- Fit joints properly before welding
- Make legs of fillet welds equal
- Make the face of fillet welds flat



Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA - AIRCO GAS PRODUCTS CO.

AIRCO

WILSON

OXYGEN IS PRODUCTION — *Don't Waste it!*

KERLOW

Give your workmen this FIRM FOOTING

Kerlow open steel flooring offers real protection against industrial accidents. This strong, economical, wear-resistant grating permits light, air and heat to pass, yet is slip-proof in all directions. It doesn't collect grease, rubbish or dirt. Sections are tailored to fit, and easily installed.

FREE BULLETIN Write for your copy today

KERLOW STEEL FLOORING CO.
23 Mallory Ave. Jersey City, N. J.

KERLOW open STEEL FLOORING

Make Every Pay Day a Bond Day
Buy U. S. War Bonds and Stamps
KERLOW RETICULATED DESIGN ... A PATTERN FOR VICTORY

It TAKES POWER to WIN WARS

ANNISTON
ORDNANCE
DEPOT
U.S. ARMY
A.O.D. 1

Davenport Better-Built Locomotives are delivering outstanding performance on a wide range of vital war assignments—here and abroad—for the United Nations because of AMPLE, easily controlled POWER, available at all times. Similarly, the United States is destined to perform a VICTOR'S role because the American people are delivering AMPLE POWER, when and where required, in the form of fighting men, fighting equipment and dollars—an irresistible outpouring which expresses the indominable SPIRIT of a determined and UNITED Free People who hold nothing in reserve when there is a job to be done.

DAVENPORT Builders to the World LOCOMOTIVES

STEAM-GASOLINE-DIESEL LOCOMOTIVES ELECTRIC OR MECHANICAL DRIVE

EXPORT FORCES BROWN & SITES 50 Church St., N. Y. Cable Add. "Brosites"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

STREETS, etc. (Contracts Awarded Cont'd.)

to E. M. Silver, Albuquerque, [illegible] 6,806 est. $25,000***8.678 mi. Santa Fe and San Miguel Counties, to Skousen Bros., Albuquerque, **$466,019** est. $500,000***5.756 mi. [illegible] Bdy Co. to Walter L. Denison, Albuquerque, $103,727, est. $80,000. Grand total $596,55[illegible] tentative award. Bids 11/10, awarded 11/[illegible] Received no bids Nov. 10 imprv. 0.143 mi. [illegible]dy Co. CD 10/30.

†North Carolina—U. S. Eng., Charlotte, construction, completion roads, drainage, Union Co., to Kiker & Yount, Reidsville, $50,000-**$100,000.**

†South Carolina—U. S. Eng., Charlotte, N. C., paving, Charleston Co., to [illegible] Loftis Co., Builders Bldg., Charlotte, N. C., under **$50,000.**

†Tennessee—U. S. Eng., P. O. Box 97, Memphis, construction, completion finish grading, graveling, surfacing streets and roads, gravel walks, drainage, incidental work, Dyer Co., to Memphis Stone & Gravel Co., Exchange Bldg., Memphis, **$100,000-$500,000.**

★ **†Texas**—U. S. Eng., Albuquerque, N. M., surfacing, El Paso Co., to Rock-Road Constr. Co., 5915 N. Rogers St., Chicago, Ill. **$500,000-$1,000,000.**

†Texas—U. S. Eng., Fort Sam Houston, road, Spec. 42-500, Bell Co., to H. B. Zachry Co., P. O. Box 596, San Antonio, over **$100,000.** Bids 11/6.

Utah—State Roads Comn., Salt Lake City, imprv. 5.36 mi. Iron Co., to J. W. Whiting Constr. Co., Springville, **$43,550.** CD 10/27—ENR 10/29.

†Utah—U. S. Eng., 32 Exchange Pl., Salt Lake City, surfacing, paving, Weber Co., to J. B. and R. E. Walker, 21st S. and 10 West Sts., Salt Lake City, under **$75,000.** Bids 10/30.

†Virginia—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., grading, drainage sys., Arlington Co., to Bright-Shepherd Co., Inc., 1343 H St., N.W., Wash., D. C. under **$50,000.**

EARTHWORK, WATERWAYS

PROPOSED WORK

Illinois—State Dpt. P. Wks. & Bldgs., Div. Hys., Springfield, retaining walls, culverts, miscellaneous construction along hy. right-of-way, Cook Co. W. W. Polk, ch. state hy engr.

Louisiana—Wm. L. Landers, Berwick, reconstructing timber boatways, constructing timber wharf, St. Marys Parish.

S. D., Mitchell—Chas. Trimmer, city engr., repairing Mitchell Dam. $150,000-$175,000.

†Texas—U. S. Eng., 1 and Douglas Sts. N.W. Wash., D. C., drainage facilities for certain portions of Ridalgo Co.

BIDS ASKED

Bids Asked December 1

†California — Bureau Reclamation, Denver, Colo., support assemblies, jacks, bases, jack wrenches, 102 in. conduit tube valves in river outlets, Shasta Dam, Kennett Div., Central Valley Project, Spec. 1677-D.

LOW BIDDERS

†Calif., Burbank—Federal Works Agency, 1206 Santee St., Los Angeles, Nov. 3, 3rd sect. Lockheed Storm Drain, from Geo. J. Bock Co and Byerts & Dunn, 1131 N. Orange Grove Ave., Los Angeles, **$162,043.** CD 10/30.

CONTRACTS AWARDED

★ **†Alabama**—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, general flood control work, Autauga Co., to W. C. Howton Contg. Co., 3904 10 Ave. N., Birmingham, **$500,000-$1,000,000.**

★ **†Ohio**—U. S. Eng., Court House, Detroit, Mich., drainage and ditch work, to R. J. Platten Concrete Contg. Co., Scranton and W. 25 Sts., Cleveland, less than **$1,000,000.**

UNCLASSIFIED

PROPOSED WORK

★ **†Calif., Fairfield-Suisun**—IMPROVEMENTS—U. S. Eng., 1209 8 St., Sacramento, imprvs. Over $2,000,000.

★ **Ia., Cedar Rapids** — IMPROVEMENTS — Maude M. Krebs, city clk., bids soon, imprvs. $900,000. CD 6/8—ENR 6/11.

Ia., Clinton—IMPROVEMENTS—City, L. L. Peterson, pres. comm., plans bond election, imprvs.

Ia., Fort Dodge—IMPROVEMENTS—City, H. Sittig, clk., voted $100,000 bonds, imprvs $200,000. Contemplate CAA participation. CD 10/16—ENR 10/29.

★ **†Ia., Mason City** — IMPROVEMENTS — Voted $50,000 bonds, imprvs. Over $700,000. CAA. CD 11/16.

When "TIME is of the essence" use VACUUM

★ U. S. Navy Official photo

Today, that old-fashioned phrase—"time is of the essence"—takes on new significance and appears in most contracts for War construction.

To SAVE TIME—and gain other advantages—the Vacuum Concrete process is used by engineers and contractors who know its value—for these ends:

To gain strength quickly and expedite form removal—28-day strength in three days.

To minimize the risk of freezing concrete in cold weather.

To gain high compressive strength, without any change in the ratio of aggregates.

To speed the finishing work—finishers follow up the concrete-placing gang quickly—right behind the vacuum processing.

See how this last point is clearly illustrated in the above photograph; an official U. S. Navy Department photo, on an unnamable job in a censored location. This shows convincingly how wet concrete quickly and thoroughly dewaters to workable finishing condition at once. The finishing gang is right behind the vacuum mats.

Look into the VACUUM PROCESS for your Post-War work. Get the details now, to have them at your command. Meantime despite the demand for our equipment, if we can help you overcome a winter concrete problem on your war job, you can count on us to do our best!

The VACUUM PROCESS has been used on eighteen million square feet of concrete on *twenty-one U. S. Navy projects.

Write for the engineering and construction data on VACUUM CONCRETE. Address Dept. N-R.

VACUUM CONCRETE, Inc.

4210 Sansom Street — Philadelphia, Pa.

★★★★★★★★★★★

EMPLOYEE IDENTIFICATION BADGES

AND TRANSPARENT

CARD HOLDERS

PARISIAN NOVELTY CO.
5-9
5-6
5-3
453
CHICAGO, ILL.

Identification Button Illustrated Actual Size.

SAFE SURE IDENTIFICATION

OF THE PERSONNEL AND PRODUCTS OF

AMERICA'S WAR INDUSTRIES!

GET QUICK DELIVERY now on Identification Badges and Transparent Card Holders for your employees. Available in a variety of identifying shapes, sizes and colors for easy recognition. Made in our factory or in your own plant by simple hand operated equipment.

For PRODUCTS identification, Parisian offers a complete line of tool checks and name plates of various plastic materials, for machinery, electrical equipment, instruction plates, etc.

Write today for Samples and full information.

PARISIAN NOVELTY COMPANY

☛ Plastic fabricators and printers. Machinery and supplies for manufacturing celluloid products. Makers of Plastic specialties for over 45 years.

3510 SO. WESTERN AVENUE • CHICAGO, ILLINOIS

Big Savings

. . . IN HANDLING MATERIALS

At a large phosphate drying plant in Florida, wet rock is stored on the ground by a Sauerman Scraper and then after draining is reclaimed to the plant by the same scraper.

Concrete aggregate for a large dam is dug from river at site of dam by Sauerman Slackline Cableway while small Sauerman Scrapers handle stockpiles between river and central mixing plant.

ON jobs where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway has an advantage over other equipment because it is able to dig, haul and place the material in a continuous, straight-line operation.

The first cost of a SAUERMAN Machine is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator. Moreover, the machine is very flexible, hence it is easy to adapt it to the exact needs of different jobs.

Get This Useful Booklet . . .

Typical examples of pit and bank excavation, alluvial mining, moving blasted ore, deep dredging, stock-piling and reclaiming, etc., are illustrated in the Sauerman catalog. A copy of this booklet is yours for the asking.

SAUERMAN BROS., INC.
532 S. Clinton St. Chicago

UNCLASSIFIED (Proposed Work Cont'd.)

Louisiana—GAS PIPELINES—Southern Gas Line, Inc., Monroe, 8 in. gas pipelines near St. Landry, Evangeline Parishes, also near Union Chapel, Rapides Parish.

★**†Mich., Ypsilanti** — IMPROVEMENTS — U. S. Eng., 700 Union Guardian Bldg., Detroit, imprvs. Over $2,000,000.

Minn., Mankato—IMPROVEMENTS—F. W. Bates, city clk., defeated bonds imprvs. $150,000. CD 10/6—ENR 10/8.

N. M., Milnesand—OIL WELL—Malco Refining Co., Hobbs, drilling, casing, developing 5,000 ft. deep test wildcat oil well. $50,000.

N. D., Fargo — IMPROVEMENTS — C. O. Jorgenson, city aud., approved bonds imprvs. Over $300,000. W. P. Tarbell, city engr. CD 10/20—ENR 10/22.

O., Athens—IMPROVEMENTS—Ohio University, Athens, imprvs. $75,000.

★**†Ore., Newport**—IMPROVEMENTS—Civil Aeronautics Admin., 14 St. between E St and Constitution Ave. N.W., Wash., D. C., imprvs., near here. $600,000.

†South Carolina—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charleston, cancelled bids to have been opened Nov. 7, imprvs., clearing, grading, grubbing, draining, paving, Proj. 231-43-3, Georgetown Co. Will readvertise. CD 11/4, under BA.

Tex., Carrizzo Springs—OIL WELL—W. I. Walton, Carrizzo Springs, drilling, casing, developing 3,000 ft. deep test oil well, I & GN Survey 23. $45,000.

Tex., Carlisle—OIL WELLS—J. C. Hawkins & Associates, Tyler, drilling, developing 8 or more deep test oil wells, near here. $150,000.

Tex., Falfurrias—OIL WELL—Sun Oil Co., McAllen, drilling, casing, developing new 8,000 ft. deep test wildcat oil well, A-2, Boedecker-State, Survey 10. $70,000.

Tex., Tyler—OIL WELLS—Hunt Oil Co., Santa Fe Bldg., Dallas, drilling campaign on 82 acre plot for deep test oil wells, near here. $150,000.

Tex., Corpus Christi—OIL WELL—Phillips Petroleum Co., Corpus Christi, drilling, casing, developing, test oil wells. $100,000.

Tex., Roma—OIL WELL—Bildridge & King, c/o Navarro Oil Co., Rio Grande City, deep test oil well development. $100,000.

Tex., Sinton—OIL WELL—F. Buttram, et al, Sinton, drilling, casing, developing deep test oil well, San Patricio Co. $60,000.

Tex., Sterling City—OIL DRILLING—Col-Tex. Refining Co. drilling campaign (oil), Sect. 8-80-W & NW.

Tex., Sterling City—OIL EXPLORATION—Plymouth Oil Co., Sterling City, deep test oil exploration, drilling, casing, developing wells. $150,000.

†Washington — IMPROVEMENTS — Civil Aeronautics Admin., Boeing Field, Seattle, imprvs. $450,000.

†Pacific Northwest—ELECTRICAL DISTRIBUTION—U. S. Eng., 810 3 Ave., Seattle, Wash., electrical distr. sys., Inv. 242.

†Pacific Northwest—GASOLINE FUELING SYSTEMS—U. S. Eng., 800 3 Ave., Seattle, Wash., 2 a.c. gasoline fueling sys., Inv. 229 and 233.

Man., Oberon—IMPROVEMENTS—Dominion Govt., Ottawa, Ont., imprvs. $300,000. Dpt. Natl. Defense for Air, Ottawa, Ont., archts. Dpt. Transport, Ottawa, Ont., engrs.

★**Que., Quebec City**—FITTING OUT BERTH—Secretary Dpt. Munitions & Supply, Ottawa, Ont., bids soon, fitting out berth. $1,500,000.

BIDS ASKED

†Massachusetts — CONSTRUCTION — U. S. Eng., Park Square Bldg., Boston, (selected list bidders) temporary construction, No. 175-43-NEG 145, Middlesex Co.

†Oklahoma—IMPROVEMENTS—U. S. Eng., Federal Bldg., Denison, Tex., imprvs., Tillman Co. Plans deposit $50.

†Oklahoma—IMPROVEMENTS—U. S. Eng., Denison, Tex., hangars, Jackson Co. Plans deposit $50.

†Texas—DAM—Christopher Iron & Chemical Co., c/o Jas. W. Christopher, Rusk, earthen and concrete dam to impound waters Cherokee Co. $250,000. Defense Plant Corp., will finance. McCrossin & Co., 120 Wall St., New York, N. Y., engrs. CD 4/6—ENR 4/9.

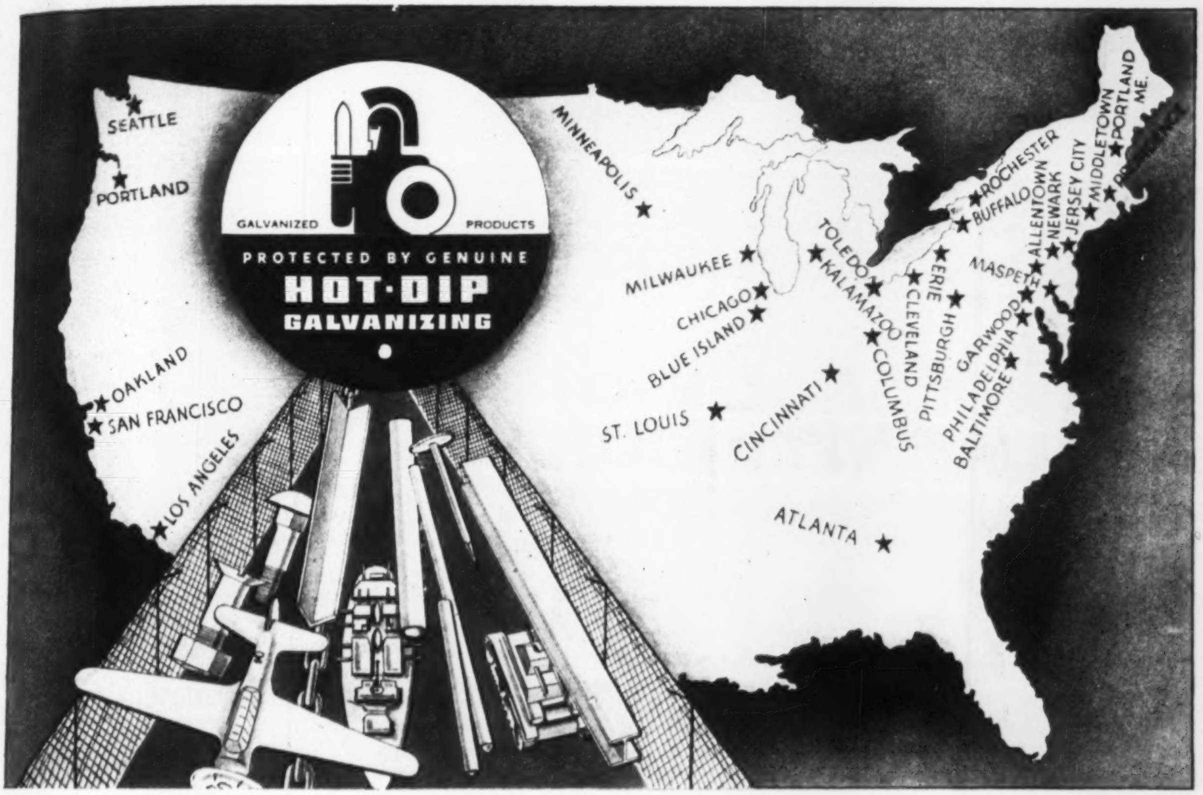
Texas—REMOVING PIPELINE CARRIER, etc.—Dunigan Tool & Supply Co., c/o Grayburg Oil Co., Smith-Young Tower, San Antonio, removing 15 mi. 8 in. pipeline carrier from Somerset to San Antonio Area and relaying. $40,000.

†Texas—ELECTRICAL DISTRIBUTION—U. S. Eng., Fort Sam Houston, electrical distr. sys., Bexar Co. $45,000.

†Texas—GASOLINE FUELING SYSTEM—U. S. Eng., 25 St. and Avenue F, Galveston, A. C. gasoline fueling sys. Plans deposit $25.

AMERICAN HOT DIP Galvanizers Association

STRATEGICALLY LOCATED WITH REFERENCE TO STEEL


GALVANIZED PRODUCTS
PROTECTED BY GENUINE
HOT-DIP
GALVANIZING
SEATTLE
PORTLAND
OAKLAND
SAN FRANCISCO
LOS ANGELES
MINNEAPOLIS
MILWAUKEE
CHICAGO
BLUE ISLAND
ST. LOUIS
CINCINNATI
ATLANTA
TOLEDO
KALAMAZOO
COLUMBUS
CLEVELAND
ERIE
PITTSBURGH
ROCHESTER
BUFFALO
MASPETH
GARWOOD
PHILADELPHIA
BALTIMORE
ALLENTOWN
NEWARK
JERSEY CITY
MIDDLETOWN
PORTLAND ME.
PROVIDENCE

WHEREVER THERE'S A NEED . . . THERE'S A MEMBER

Rigidly *adhering* to the highest standards of quality at reasonable prices, *maintaining* the most modern and completely equipped shops, *employing* expertly trained personnel, *enjoying* the constant help of an efficient research department, this association represents *the* pioneering, stabilizing anchor of the galvanizing world . . . It is *your guarantee* of getting good work quickly and a genuine Hot Dip Job every time . . . Why gamble—deal with a *known* quality—send your materials to any one of our very conveniently located members. WE ARE ORGANIZED FOR HIGH SPEED, EFFICIENT PRODUCTION. American Hot Dip Galvanizers Association, Inc., American Bank Bldg., Pittsburgh, Pennsylvania.

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE

Acme Galvanizing, Inc., Milwaukee, Wis. ★ Acme Steel & Malleable Iron Works, Buffalo, N.Y. ★ American Tinning & Galvanizing Co., Erie, Pa. ★ Atlantic Stamping Co., Rochester, N.Y. ★ Atlantic Steel Co., Atlanta, Ga. ★ Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N.Y. ★ Commercial Metals Treating, Inc., Toledo, Ohio ★ Diamond Expansion Bolt Co., Inc., Garwood, N.J. ★ Equipment Steel Products Division of Union Asbestos and Rubber Co., Blue Island, Ill. ★ The Fanner Mfg. Co., Cleveland, O. ★ John Finn Metal Works, San Francisco, Cal. ★ Galvanizers Incorporated, Portland, Oregon ★ Thomas Gregory Galvanizing Works, Maspeth, N.Y. ★ Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa. ★ James Hill Mfg. Co., Providence, R.I. ★ Hubbard & Co., Oakland, Cal. ★ Independent Galvanizing Company, Newark, N.J. ★ International-Stacey Corp., Columbus, O. ★ Isaacson Iron Works, Seattle, Wash. ★ Joslyn Co. of California, Los Angeles, Cal. ★ Joslyn Mfg. & Supply Co., Chicago, Ill. ★ L. O. Koven & Brother, Inc., Jersey City, N. J. ★ The Thomas Laughlin Co., Portland, Maine ★ Lehigh Structural Steel Co., Allentown, Pa. ★ Lewis Bolt & Nut Co., Minneapolis, Minn. ★ Missouri Rolling Mill Corp., St. Louis, Mo. ★ The National Telephone Supply Co., Cleveland, O. ★ Oliver Iron & Steel Corporation, Pittsburgh, Pa. ★ Penn Galvanizing Co., Philadelphia, Pa. ★ Riverside Foundry & Galvanizing Co., Kalamazoo, Mich. ★ San Francisco Galvanizing Works, San Francisco, Cal. ★ The Sanitary Tinning Co., Cleveland, O. ★ Southern Galvanizing Company, Baltimore, Md. ★ Standard Galvanizing Co., Chicago, Ill. ★ Wilcox, Crittenden & Company, Inc., Middletown, Conn. ★ The Witt Cornice Company, Cincinnati, Ohio

OFFICIAL • INSIGNIA
HOT-DIP GALVANIZING
AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC.

NOW READY!

to help you plan and design hydraulic works

quicker—better

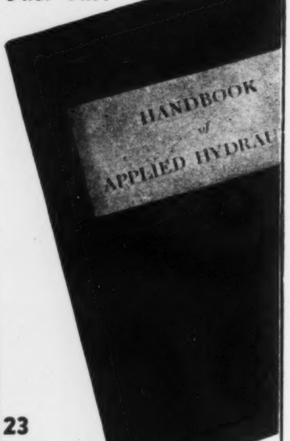
A NEW
complete
MANUAL
of tested, up-to-date time-saving

- data
- tables
- diagrams
- facts
- formulas
- pointers

HERE at last is the hydraulic engineering profession's own handbook, comparable to the standard handbooks available in other fields of engineering! Here—in one big, usable manual—is the data you need to refer to constantly in planning and designing all types of hydraulic works—fundamental principles, up-to-date procedures, helpful pointers, details, needed formulas, time-saving tables, explanatory diagrams and illustrations—all arranged conveniently for handy, quick reference—an abundance of useful data which will guide you correctly in your work of developing modern, efficient hydraulic structures.

HANDBOOK OF APPLIED HYDRAULICS

Just out!



Compiled by a Staff of Specialists
CALVIN VICTOR DAVIS
Editor-in-Chief, Project Engineer, Fontana Dam, N. C., Tennessee Valley Authority

1100 pages, 6 x 9, 645 illustrations, many tables, $7.50

For the first time, this important new Handbook treats together in a single, complete volume all major problems and phases of hydraulic engineering. It covers hydrology, water supply, sewerage, water power, hydraulic structures, and all other related subjects essential to proper understanding and successful solution of on-the-job problems. Eighteen specialists closely associated with progress in this field have contributed their experience, research and knowledge and give full information concerning the advances, methods, preferred and newer practices that are known to be particularly helpful in the planning and designing of efficient hydraulic works.

More than 1000 pages cover details such as these:

—reservoir design studies
—design of gravity dams
—structures for difficult or soft foundations
—typical designs of earth dams
—taitcr, hinged-leaf, vertical-lift, bear-trap, rolling, and drum gates
—types of spillways
—canals, flumes, covered conduits, tunnels, pipe lines, hydroelectric plants
—powerhouse equipment
—design of pipe distribution systems
—sewer appurtenances and special structures
—pumping installations

23 Big Sections
chock-full of useful up-to-the-minute data

1. Hydraulic Formulas
2. Hydrology
3. River Regulation by Reservoirs
4. Gravity Dams
5. Arch Dams
6. Buttress Dams
7. Earth Dams
8. Rock-fill Dams
9. Spillways and Stream-bed Protection Works
10. Spillway Crest Gates
11. High-pressure outlet Works
12. Canals, Flumes, Covered Conduits, Tunnels, and Pipe Lines
13. Hydroelectric Plants
14. Hydraulic Machinery
15. Water Supplies
16. Water Distribution
17. Water Treatment
18. Sewerage
19. Sewage-treatment Hydraulics
20. Irrigation
21. Irrigation Structures
22. Drainage
23. Hydraulic Models

10 DAYS' FREE EXAMINATION

McGraw-Hill Book Co., 330 W. 42nd St., New York

Send me Davis' Handbook of Applied Hydraulics for 10 days' examination on approval. In 10 days I will send you $7.50 plus few cents postage or return book postpaid.

Name ....

Address ....

City and State..

Position ....

Company .. ..NR. 11-19-42

UNCLASSIFIED (Bids Asked, [illegible])

†Texas — IMPROVEMENTS — [illegible] S. Eng., Fort Sam Houston, imprvs., Spe[illegible] 2-581.

†Texas—IMPROVEMENTS—U. [illegible] Eng., 25 St. and Ave. F, Galveston, impr[illegible] Webb Co. $60,000. Plans deposit $25.

†Texas—IMPROVEMENTS—U. [illegible] Eng., 25 St. and Avenue F, Galveston, [illegible]s, Tom Green Co. $40,000. Plans deposi[illegible]

†Texas—IMPROVEMENTS—U. [illegible] Eng., 25 St. and Avenue F, Galveston, impr[illegible] Victoria Co. $150,000. Plans deposit $25.

†Texas—IMPROVEMENTS—U. [illegible] Eng., 25 St. and Avenue F, Galveston, im[illegible]s, bldg., Brazos Co. $75,000. Plans deposit [illegible]

†Texas—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imp[illegible]s., Maverick Co. $75,000. Plans deposit [illegible]

Tex., Alba—OIL WELL—Amerada Petroleum Co., Petroleum Bldg., Dallas, drilling, casing, developing deep test oil well, B. Smith Survey, Coke Field, near here. $60,000.

Tex., La Gloria—OIL WELL—Shell Oil Co., Corpus Christi, drilling, developing [illegible],100 ft. deep test oil well, 4½-in. casing. $6[illegible],000.

Tex., Pettus—OIL WELL—Union Producing Co., Pettus, drilling, casing, developing 7,500 ft. deep test oil well (1 or more wells). Over $25,000.

Tex., Snyder—OIL WELLS—Col-Tex Refining Co., Colorado City, drilling, casing, developing two 4,000 ft. deep test oil wells. $80,000.

LOW BIDDERS

†California—IMPROVEMENTS—U. S. Eng., 1209 8 St., Sacramento, Nov. 9, imprvs., Spec. 257, Contra Costa Co., from F. C. Stolte, 1405 San Antonio Ave., Alameda. **$100,000-$500,000.**

†California—NIGHT LIGHTING SYSTEM—U. S. Eng., 1209 8 St., Sacramento, Nov. 10, night lighting sys., Spec. 277, Butte Co., from Underground Constr. Co., 354 Hobart St., Oakland, under **$50,000.** CD 11/5.

†California—UTILITIES—U. S. Eng., 1209 8 St., Sacramento, Nov. 10, utilities, Spec. 262, Contra Costa Co., from De Lucca & Son, Inc., 1745 Filbert St., San Francisco, under **$50,000.** CD 11/5.

†California—IMPROVEMENTS—U. S. Eng., 1209 8 St., Sacramento, imprv., Spec. 286, Shasta Co., from Louis Vistica, Live Oak, under **$50,000.**

†California—NIGHT LIGHTING SYSTEM—U. S. Eng., 1209 8 St., Sacramento, Nov. 12, night lighting sys., Merced Co., from Globe Electric Works, 1899 Mission St., San Francisco, under **$50,000.**

Calif., San Francisco—PIER—General Eng. & Drydock Co., Filbert and Sansome Sts., Nov. 12, altering Pier 25, from G. P. W. Jensen & Sons, Inc., 320 Market St. CD 11/10—ENR 11/12.

N. H., Concord—IMPROVEMENTS—State Airport Comn., Concord, Nov. 12, imprvs., from Johns & Lugg, 1 Tremont St., **$40,908.** CD 11/2—ENR 11/5.

†Nevada — IMPROVEMENTS — U. S. Eng., 4550 Brazil St., Los Angeles, Calif., imprvs., Nev. Solic. 66-B, Nye Co., from C. J. Paradis, 2320 Idell St., Los Angeles, Calif.

†Texas and **Oklahoma**—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, Tex., imprvs., Solic 257-43-115, from E. B. Latham Const. Co., 4622 Monarch St., Dallas, **$100,000-$500,000.** CD 11/4—ENR 11/12.

†Texas—FLOODGATES—U. S. Eng., 25 St. and Avenue F, Galveston, Nov. 9, floodgates on Louisiana and Texas Intracoastal waterway at Colorado River, Matagorda Co., from Brown & Root, Inc., Box 3, Houston. Bids 11/9. CD 10/27—ENR 10/29.

†Texas — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, imprvs., Matagorda Co., from Spicer Inc., Box 322, Oklahoma City, Okla.

★**†Virginia**—IMPROVEMENTS—U. S., Eng., 415 P. O. and Courthouse Bldg., Norfolk, Nov. 11, imprvs., Inv. No. 616-43-4, Greenville Co., from W. H. Scott, Inc., Franklin, **$615,630.**

CONTRACTS AWARDED

†Arizona—GASOLINE FUELING SYSTEM—U. S. Eng., Albuquerque, N. M., gasoline fueling sys., Cochise Co., to De Luca & Son, 1745 Filbert St., San Francisco, Calif., **$50,000-$100,000.** CD 11/4—ENR 11/12.

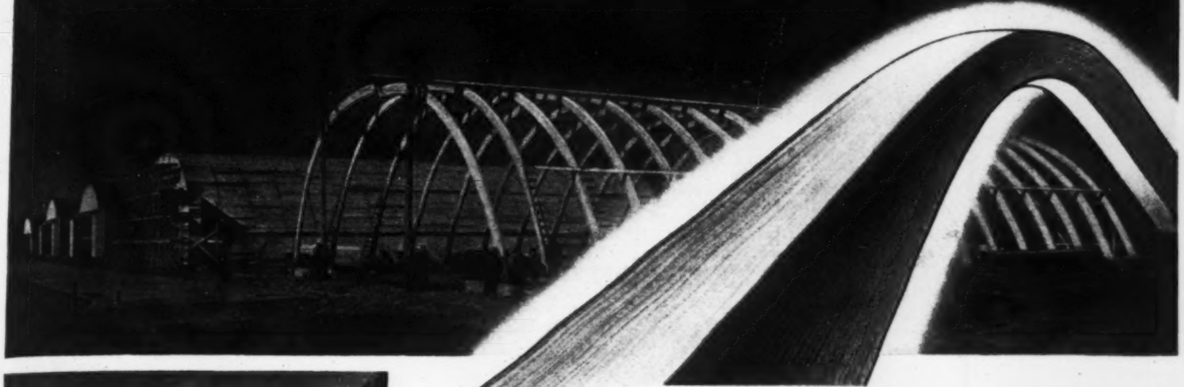
†Arkansas—IMPROVEMENTS—U. S. Eng., 300 Bway., Little Rock, imprvs., Jackson Co., to Thos. P. Coogan, Com. Natl. Bank Bldg., Little Rock.

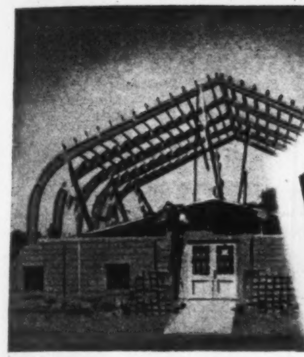
†Arkansas—IMPROVEMENTS—U. S. Eng., 300 Bway., Little Rock, imprvs., housing, Arkansas Co., to Thos. P. Coogan, Com. Natl. Bank Bldg., Little Rock, less than **$100,000.**

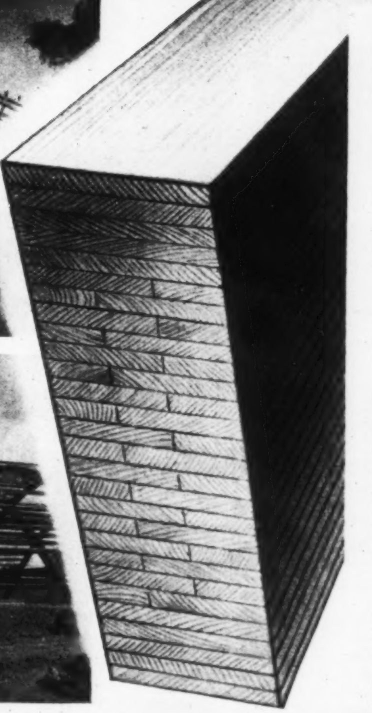
†California—DRY FILL—U. S. Eng., 74 New Montgomery St., San Francisco, dry fill, Alameda Co., to Macco Constr. Co., 815 Paramount Blvd., Clearwater. Awarded 11/13.

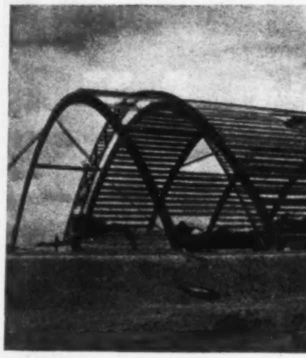
WOOD and GLUE

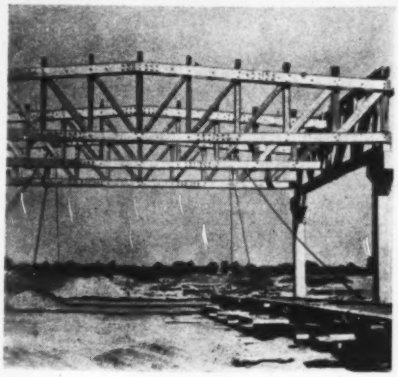
FORM TODAY'S ROOF TRUSSES, ARCHES AND BEAMS











RILCO FACTORY FABRICATED LAMINATED PRODUCTS

are available for priority construction

▶ Wood and glue are meeting the present rush needs for fast, economical construction. From them Rilco is factory fabricating glued laminated roof arches, trusses and beams for buildings with vast, post-free spans up to 200 feet.

Right now Rilco Laminated Products are being used in the construction of factories, airplane hangars, drill halls, storage buildings, churches, theatres, recreation centers. They are designed and engineered for the specific job—factory fabricated under rigid supervision in five Rilco plants strategically located for prompt service. They are delivered to the job, ready for fast erection.

Whatever the structure, wherever the location, *North*, *South*, *East* or *West*, Rilco is ready to deliver the size and type of structural framing members required. Complete engineering data and design cooperation is available to architect and engineer. Write today for information on Rilco Laminated Products.

Copyright 1942, R. L. P. Inc.

RILCO

DESIGNERS
AND FABRICATORS OF
ENGINEERED WOOD
PRODUCTS FOR A WIDE
VARIETY OF USES

RILCO LAMINATED PRODUCTS, INC.
A Weyerhaeuser Institution
1596 FIRST NATIONAL BANK BUILDING, SAINT PAUL, MINNESOTA
Factories: ALBERT LEA, MINN., BRODHEAD, WIS., CHICAGO, ILL., HUNTINGTON, IND., WILKES BARRE, PA.

REZNOR
Gas Unit Heaters

NOW AVAILABLE For War Production Factories . .

Restrictions on the manufacturing of Reznor Gas Unit Heaters have been removed by W. P. B. This action will not make heaters available to anyone other than armed forces and industries with high priority ratings. Thus, war factories may be provided with a system which saves 89% in vital materials. Reznor equipment also requires less installation time, and it economically moves more warm air over wider areas. Write today.

REZNOR MFG. CO.
105 James St. Mercer, Penna.

★

GAS HEATERS EXCLUSIVELY
SINCE 1888

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†California—IMPROVEMENTS—U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., San Mateo Co., to A. F. Mattock Co., 212 Clara St., San Francisco. Awarded 11/13.

†California — GASOLINE STORAGE FACILITIES—U. S. Eng., 74 New Montgomery St., San Francisco, gasoline storage facilities, Del Norte Co., to A. Brizard, Inc., Arcata.

†California—GRADING, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, grading, drainage, track moving, Los Angeles Co., to Calowell Constr. Co., 1835 E. Wardlow Rd., Long Beach, less than **$100,000.** Awarded 10/31.

†California—IMPROVEMENTS—U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., San Francisco Co., to C. L. Harney, 625 Market St., San Francisco. Awarded 11/9.

†California — RAILROAD HOLD YARD — U. S. Eng., 74 New Montgomery St., San Francisco, railroad hold yard, Alameda Co., to Ben C. Gerwick, Inc., 112 Market St., San Francisco. Awarded 11/9.

†California—STABILIZING AREAS—U. S. Eng., 74 New Montgomery St., San Francisco, stabilizing areas, Santa Cruz Co., to Pacific Truck Service, Inc., 646 Park Ave., San Jose. Awarded 11/9.

Calif., Moraga—SWIMMING POOL, etc.—St. Mary's College, Moraga, new outdoor swimming pool, converting present one to all-year indoor pool, new all wood 100x420 ft drill hall with 3 towers at either end, incl. offices and classrooms, combination warehouse and workshop, imprv. bridge and roads at station entrance, to Eaton & Smith, 715 Ocean Ave., San Francisco. H. A. Minton, 155 Sansome St., San Francisco, archt. L. H. Nishkian, 155 Sansome St., San Francisco, engr.

†Florida—AUTOMATIC SPRINKLER SYSTEM—U. S. Eng., U. S. Court House & Post Office, Jacksonville, automatic sprinkler sys., Inv. Jax 43-325, Polk Co., to Moore Pipe & Sprinkler Co., 1150 W. State St., Jacksonville, less than **$50,000.**

†Florida—CLEARING, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, grading for roads, etc., appurtenant work, etc., Lee Co., to Mills & Williams, 3905 NW., 27 Ave., Miami, **$100,000-$500,000.**

†Florida — ELECTRICAL DISTRIBUTION FACILITIES—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, addnl. electrical distr. facilities, Inv. NEG-MD-43-10, Hillsborough Co., to Bigby Electric Co., 305 Franklin St., Tampa, less than **$50,000.**

†Florida — GASOLINE STORAGE and FUELING—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, addnl. gasoline storage and fueling facilities, Inv. NEG-JMA 48-8, Duval Co., to Clyde J. Keys, First Federal Bldg., St. Petersburg, less than **$50,000.**

†Florida—GASOLINE STORAGE, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, gasoline storage and fueling sys., Sarasota Co., to J. B. Green Plumbing Co, Sarasota, less than **$50,000**

†Florida—GASOLINE STORAGE and FUELING SYSTEM—U S. Eng., U. S. Courthouse & Post Office, Jacksonville, gasoline storage and fueling sys., Pasco Co., to Ryan Constr. Co., Inc., Stovall Office Bldg., Tampa, less than **$50,000.**

†Florida—IMPROVEMENTS—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, imprvs., addnl. paving, etc., Inv. NEG-JAX 43-322, Highlands Co., to G. A. Hanson Co., Inc., 1st Natl. Bank Bldg., Tampa, less than **$100,000.**

†Florida—SOIL PREPARATION, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, soil preparation, fertilizing, sprigging, seeding, Inv. NEG-JAX-43-32, Dade Co., to Holding Farms Co., Inc., Dania, less than **$50,000.**

†Florida—GASOLINE STORAGE TANKS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., gasoline storage tanks, Okaloosa Co., to Kenneth Fulghum, Theisen Bldg., Pensacola, under **$50,000.** Awarded 11/10.

†Georgia—IMPROVEMENTS—U. S. Eng., Post Office Bldg., Savannah, imprvs., grading, draining, etc., Toombs Co., to E. H. Hines, Greenwood, S. C., and Robert Lee, Inc., Manning, S. C., **$100,000-$500,000.**

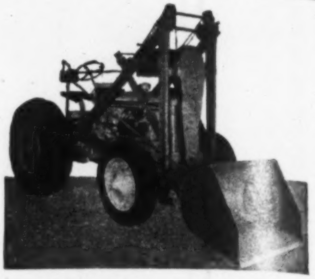
†Georgia—STORAGE SYSTEM, etc.—U. S. Eng., Post Office Bldg., Savanna, storage and dispensing sys. and gasoline sys., Richmond Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under **$50,000.**

★**†Indiana**—GASOLINE FUELING SYSTEM—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., A. C. gasoline fueling sys., N-223, Allen Co., to H. B. Culbertson Co., 2842 West Grand Blvd., Detroit, Mich. Est. less than **$1,000,000.**

†Kansas—AUTOMATIC FIRE ALARM SYSTEM—U. S. Eng., Albuquerque, N. M., automatic fire alarm sys., Finney Co., to American District Telegraph Co., 158 N. Topeka St., Wichita, under **$50,000.**

†Kansas — IMPROVEMENTS — U. S. Eng., Wright Bldg., Tulsa, Okla., imprvs., Barton Co., to A. T. Nolan, 20 N. 2 St., Minneapolis, Minn., **$100,000-$500,000.**

†Kansas—UTILITIES, etc.—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., utilities, to Empire Constr. Co., 901 S. 40 St., Omaha, Neb•••



FRONT END SHOVELS
for Case Tractors
Extensible Booms—8' Lift
½ and ⅝ cu.yd. Capacity.

Other Products
CONCRETE VIBRATORS
Gasoline Engine and Electric Motor Driven Models
HEATING KETTLES
for Asphalt and Tar
AGGREGATE DRYERS
For Stone and Sand
ASPHALT PLANTS
Portable — Stationary

Write for Circulars

White Mfg. Co.
ELKHART INDIANA

STEEL PLATE
FABRICATION

With the most modern, completely equipped fabricating shop in the middle west, and a working force of skilled craftsmen capable of handling any project regardless of design, size or weight, we stand ready to serve you promptly and efficiently.

THE R. C. MAHON COMPANY
DETROIT, MICHIGAN

MAHON

UNCLASSIFIED (Contracts Awarded, Cont'd.) fencing, to Home & Building Materials Corp., 202 S. Denver St., Tulsa, Okla.***water wells, to Floyd Kelley, Arkansas City, all Barton Co.

†Louisiana—AIR CONDITIONING—U. S. Eng., foot of Prytania St., New Orleans, air conditioning in link trainer bldg., to Doherty-Stirling, Inc., 3150 Florida St., Baton Rouge.

†Louisiana—FUELING SYSTEM—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., fueling sys., Ouachita Parish, to W. C. Salley, Monroe, under **$50,000.**

★ **†Louisiana**—IMPROVEMENTS—U. S. Eng., Foot of Prytania St., New Orleans, imprvs., constructing, completion roads, parking areas, driveways, drainage structures, shell walks, to Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge, less than **$1,000,000.**

†Maryland—PAINTING—U. S. Eng. Standard Oil Bldg., Baltimore, painting, Baltimore Co., to James Gibbons Co., Relay, under $50,000.

†Massachusetts—RAILROAD—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., railroad tracks, No. 699-43-94, Hampden Co., to Lane Constr. Co., 37 Colony St., Meriden, Conn. Est. under **$50,000.** Bids 11/2.

★ **†Michigan**—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Court House, Detroit, electric distr. sys., Washtenaw Co., to Harlan Electric Co., 3139 Hamilton Ave., Detroit, less than **$1,000,000.**

★ **†Michigan**—TRANSMISSION LINE—U. S. Eng., Court House, Detroit, Mich., 24,000 volt transmission line, Washtenaw Co., to Detroit Edison Co., 2000 2 St., Detroit, Mich., less than **$1,000,000.**

†Mississippi—GASOLINE FUELING SYSTEM—U. S. Eng., foot of Prytania St., New Orleans, La., gasoline fueling sys., Jones Co., to Cotter Plumbing & Heating Co., Columbians Mutual Tower Bldg., Memphis, Tenn., less than **$50,000.** Bids 11/7, awarded 11/7. CD 11/4.

†Mississippi—GRASSING, etc.—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., grassing, etc., Jones Co., to Ed McCoy, Pritchard, Ala., less than **$50,000.** Awarded 11/7.

†Mississippi—TRAILER CAMP—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., trailer camp, to McDonald Bros., Tower Petroleum Bldg., Dallas, Tex. **$38,362.**

†Missouri—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs., Buchanan Co., to Sioux Syndicate, Sioux Falls, S. D. Est. under **$50,000.**

†New Hampshire—COAL STORAGE—U. S. Eng., Park Square Bldg., Boston, Mass., facilities, coal storage, No. 175-43NEG 137, Hillsboro Co., to Davison Constr. Co., 1306 Elm St., Manchester. Est. under **$50,000.** Bids 11/10.

†New Jersey—CONSTRUCTION—U. S. Eng., 120 Wall St., New York, N. Y., addnl. construction, Essex Co., to Arthur Venneri Co., 259 N. Broad St., Elizabeth, **$50,000-$100,000.**

†New Jersey—MOTOR POOL FACILITIES—U. S. Eng., 120 Wall St., New York, N. Y., motor pool facilities, Monmouth Co., to Hansen-Jensen, Inc., 337 N. Broad St., Elizabeth, **$50,000-$100,000.**

†New Jersey—SEEDING, etc.—U. S. Eng., 120 Wall St., New York, N. Y., seeding, painting, road treatment, Middlesex Co., to Robert W. Cleveland & Co., 19 N. Harrison St., East Orange, **$50,000-$100,000.**

N. J., Trenton—IMPROVEMENTS—Trenton Div. General Motors Corp., Parkway Ave., imprvs., to Daniel F. MacNamee & Co., 271 North Ave., New Rochelle, N. Y., **$250,000** plus.

N. M., Pinon—OIL WELL—Hunt Oil Co., Santa Fe Bldg., Dallas, Tex., drilling, developing 5,000 ft. deep test oil well in Permien Basin, to Helmerich & Payne, Inc., Philtower Bldg., Tulsa, Okla., approx. **$70,000.** Est. $75,000. CD 11/10—ENR 11/12.

†North Carolina—GASOLINE SYSTEM—U. S. Eng., 33 Customhouse, Charleston, S. C., gasoline sys., Robeson Co., to Webb Electric Co., Anderson, S. C. under **$50,000.**

†Ohio—SEEDING, etc.—U. S. Eng., Lockbourne, seeding, fertilizing and soil preparation, imprvs., Franklin Co., to Ohio Engineering Co., Lorain, under **$100,000.**

★ **†Ohio**—STEAM DISTRIBUTION—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., outside steam distr. sys., Allen Co., to E. W. File, Lima, less than **$1,000,000.**

★ **†Oklahoma** — IMPROVEMENTS — U. S. Eng., 231 W. Main St., Denison, Tex., imprvs., Carter Co., to Cowdin Bros., 411 S. Haskell St., Dallas, Tex. Est. exceeds **$1,000,000.** CD 9/23—ENR 10/1.

Ore., Portland—DOCK—City Building Dpt., reconditioning dock, S. E. Belmont and Yamhill Sts., to Portland Tug & Barge Co., 8444 N. W. St. Helens Rd., **$25,000. Awarded** 11/10. Transport Bodies, Inc., lessee.

†Rhode Island—UTILITIES—U. S. Eng., 819 Industrial Trust Bldg., Providence, utilities, No. 699-43-89, Newport Co., to A. E. Bragger Constr. Co., 33 Potter Ave., Warwick. Est. under **$50,000.**

KNOW HOW

TO GET NEW PUMPS FOR OLD
. . . IF THEY ARE NOVOS

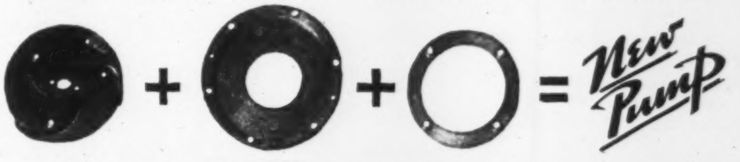
If you do not have a high Priority to secure a new Pump or if deliveries are too long—A NOVO SELF-PRIMING CENTRIFUGAL PUMP can be put in first class condition by replacing the Impeller, Wear Plates and Seal. These parts can be shipped on an A-10 rating which can be secured from your Novo Distributor and installed by him or your mechanic. In the majority of cases these parts properly installed will give practically new pump operation.

SEE ENGINE FACTORY OVERHAUL BELOW

With any AA rating we can make reasonably fast shipment on practically all sizes of new pumps, but we want to also help those friends of ours who have Novo Pumps which they are unable to replace.

Look your Pumps over and see your Distributor or write us about putting them back into service.

NEW IMPELLER and WEAR PLATES



FACTORY OVERHAUL OF ENGINE

A factory overhaul for your Novo Engine regardless of the equipment on which it is mounted, Pump, Hoist, Mixer, Light Plant, etc., will make the heart of that equipment practically new and these jobs carry a new equipment guarantee—See your Novo Distributor or write us for full information.

SEND FOR INFORMATION. .

NOVO ENGINE CO., 200 PORTER ST., LANSING, MICH.
Send me information on How to Make New Pumps Out of Old ____
On Novo Engine Factory Overhaul
Also send literature on new Self-Priming Centrifugal Pump ____
Diaphragm Pump ____ Pressure Pump ____
Name ____
Address ____
City ____ State ____

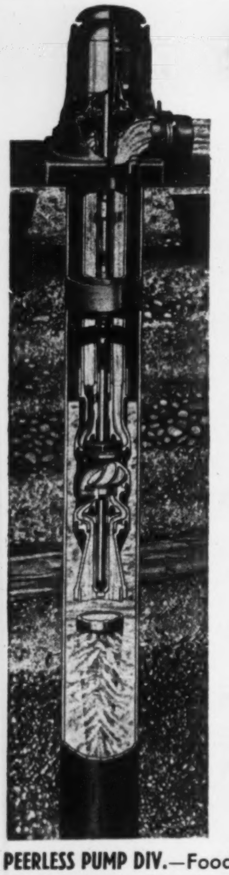
NOVO ENGINE COMPANY
LANSING, MICHIGAN

Peerless Pumps Speed America's Production!

BEHIND the battle lines, America must be literally floated to victory. Every minute of the day, billions and billions of gallons of water are needed to supply the increasing demands of sweating men, speeding machines and swiftly moving materials. Above all, it must be delivered quickly, economically and in sufficient quantities to keep production lines moving at top speed.

EACH DAY Peerless Pumps are unceasingly pouring billions of gallons of water into the Nation's humming industrial plants. And it is here that the high quality and sustained efficiencies of Peerless Pumps are proving their value.

THERE are no production delays because of pump failures . . . only a steady high-capacity delivery that is making the most of our limited time.



PEERLESS PUMPS

PATENTED DOUBLE SEAL

DOUBLE BOWL BEARINGS

WIDEST RANGE OF CAPACITIES

UP TO 15,000 G.P.M. IN TURBINE TYPES

UP TO 200,000 G.P.M. IN HYDRO-FOIL PROPELLER TYPES

ALL FORMS OF DRIVE

NATIONWIDE SUPER SERVICE

●

Ask for Literature.

Also inquire about Peerless Gasoline and Fuel Oil Pumps for direct refueling and transfer.

PEERLESS PUMP DIV.—Food Mach'y. Corp.
301 West Avenue 26 • Los Angeles, California
1250 Camden Avenue S. W. • Canton, Ohio

★ WATER OR OIL LUBRICATION
Peerless
TURBINE PUMPS

UNCLASSIFIED (Contracts Awarded, Cont'd.)

★**†R. I., Quonset Point**—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, Supplementary Agreement 8, NOY 4175, to Merritt-Chapman & Scott Corp., 17 Battery Pl., and George A. Fuller Co., 597 Madison Ave., New York, N. Y., **$6,065,199.** Awarded 11/4. Additional to CD 8/28—ENR 9/3 under CA.

†South Carolina—ELECTRICAL DISTRIBUTION—U. S. Eng., 33 Customhouse, Charleston, electrical distr. rearrangement of lighting equip., Charleston Co., to H. B. Nelson Constr. Co., Red Rock Bldg., Atlanta, Ga., under **$50,000.**

†South Carolina—FIRE ALARM SYSTEM—U. S. Eng., 33 Customhouse, Charleston, installing fire alarm sys., Charleston Co., to Palmetto Electrical Constr. Co., 149 Calhoun St., Charleston, under **$50,000.**

†Tennessee — STEAM GENERATING PLANT, etc.—U. S. Eng., P. O. Box 97, Memphis, steam generating plant, bldg. and steam distr. sys., also a.c. lubrication sys., all Lauderdale Co., to W. A. Beck, Inc., 1031 S. Big Ben Blvd., St. Louis, Mo., under **$150,000.**

†Texas-Arizona and **Kansas**—FIRE ALARM SYSTEMS—U. S. Eng., Albuquerque, N. M., automatic fire alarm sys. in above states, to American District Telegraph Co. of Kansas, 1 and Topeka Sts., Wichita, Kan., **$100,000-$500,000.**

†Texas and **Louisiana**—REMOVING PIPELINE CARRIER—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., removing 154 mi. 8 in. steel pipeline carrier between Iraan, Crockett Co., and vic. Del Rio, Tex., and relaying in certain sectors East Texas and Louisiana, to Illinois Pipe Line Corp., Del Rio, approx. **$169,000.** CD 11/4—ENR 11/12.

Texas and **Louisiana** — PIPELINE REMOVAL — Texas Co., 720 San Jacinto St., Houston, Tex., removing 123 mi. 10 in. steel pipeline from point between Del Rio and Lytle, Tex., and relaying at certain points in East Texas and Louisiana, to Texas Pipe Line Co., Texas Bldg., Houston, Tex., approx. **$148,000.** CD 11/4—ENR 11/12.

†Texas — GASOLINE STORAGE SYSTEM, etc.—U. S. Eng., Fort Sam Houston, addnl. gasoline storage and dispensing sys., Spec. 42-436, Bexar Co., to Anderson & Waite, 726 W. Russell St., San Antonio, under **$50,000.** Bids 10/30. CD 10/26.

†Texas — GASOLINE and FUELING SYSTEM — U. S. Eng., 231 W. Main St., Denison, gasoline and fueling sys., Dallas Co., to P. E. Workman Co., Liberty Bank Bldg., Dallas, **$50,000-$100,000.**

†Texas—COLD STORAGE SYSTEM—U. S. Eng., Federal Bldg., Galveston, cold storage sys., Howard Co., to Van Cleve Constr. Co., 3608 Telephone Rd., Houston, **$100,000-$500,000.**

†Texas—CONDITIONING, SODDING, etc.—U. S. Eng., Fort Sam Houston, 534 acres conditioning, sodding, 110 acres grading, leveling, etc., to R. E. Briggs & Co., Sunset Rd., San Antonio, under **$50,000.**

†Texas — COOLING SYSTEM, etc. — U. S. Eng., Fort Sam Houston, cooling sys., water piping, electrical facilities, etc., Spec. 42-441, Medina Co., to Way Eng. Co., 1901 Caroline St., Houston, under **$50,000.** Bids about 11/5.

†Texas — ELECTRICAL DISTRIBUTION SYSTEM — U. S. Eng., 25 St. and Avenue F, Galveston, outside electrical distr. sys., Galveston Co., to C. O. Baker, 2402 Alban Rd., Houston, under **$50,000.** Bids 11/3. CD 10/27, under Public Bldgs.

†Texas—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, imprvs., grading, roads, streets, driveways, Solic. 257-43-122, Smith Co., to Campbell & Kay, Tyler, **$100,000-$500,000.** CD 11/9—ENR 11/12.

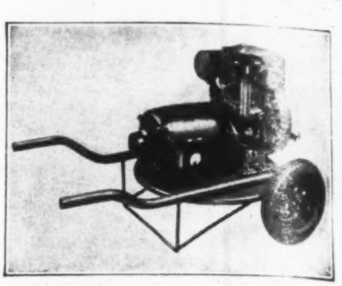
†Texas—IMPROVEMENTS—U. S. Eng., 25 St. and Ave. F, Galveston, imprvs., clearing, grubbing, grading, Maverick Co., to J. L. Selber, 5502 Chaucer Dr., Houston, **$50,000-$100,000.**

†Texas — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, imprvs., to Cage Bros., Bishop, **$100,000-$500,000;** bldgs., WW., sewers, gas lines, to Younger Eng. Co., 824 Milam Bldg., San Antonio, **$100,000-$500,000,** all Victoria Co. Bids 10/31. CD 10/28.

†Texas — LOADING FACILITIES — U. S. Eng., Albuquerque, N. M., loading facilities, El Paso Co., to Neill Singleton, P. O. Box 2130, Amarillo, **$50,000-$100,000.** Bids 11/2. CD 10/22.

†Texas—RAILROAD SPURS—U. S. Eng., Fort Sam Houston, supplementary contract addnl. railroad spurs, siding, to W. A. Smith Constr. Co., 301 Greig St., Houston, under **$50,000.** Additional to CD 8/26—ENR 9/3, under CA.

†Texas — UNDERGROUND UTILITIES — U. S. Eng., Citizens Bank Bldg., Denison, underground utilities, Smith Co., to B. G. Welborn, 1319 Wilbur St., Dallas, **$100,000-$500,000.**



PORTABLE GENERATOR SETS

Capacities 650 watts to 9400 watts

Master offers 21 Standard sizes of continuous-duty, ruggedly-built, gas-powered Generator Plants, to furnish power for lighting, saws, tools and Master Electric Vibrators, and other standard electrically powered equipment, within the scope of a given Generator size.

MANUFACTURERS OF

- Gas-Electric Generator Plants, 650 Watts to 9400 Watts—AC or DC
- "Big 3" Gas-Electric Power Units, for Electric Generation, Concrete Vibration & Tool Operation.
- Concrete Vibrators—Gas or Electric.
- Concrete Surfacing Attachments.
- Master Power Blow Hammers & Tools.
- Complete Line of High Speed Tools.

Master Distributors throughout United States and Canada. All Foreign territories—Armco International Corporation.

Send for #528 Bulletin today.

Master Vibrator Co., Dayton, Ohio

WET *Jobs?*

Dry Subgrades Guaranteed with

GRIFFIN WELLPOINT SYSTEMS

Whether you Buy or Rent!

YOU'LL REDUCE ALL YOUR COSTS ON WET EXCAVATIONS WITH GRIFFIN EQUIPMENT

Lowest costs for . . .
INSTALLATION, OPERATION & MAINTENANCE

Highest capacity in . . .
WELLPOINTS, VACUUM & WATER PUMPS

BOTH *Equipment and Dry Jobs are guaranteed - - - Let us prove that*
GRIFFIN EQUIPMENT IS BETTER!

GRIFFIN WELLPOINT CORP.
881 EAST 141st STREET • NEW YORK, N. Y.
Phones: MElrose 5-7704-5-6

UNCLASSIFIED, etc. (Proposed Work, Cont'd.)

†Texas—UTILITIES—U. S. Eng., Fort Sam Houston, underground utilities, Tex. 42-522, Bexar Co., to Anderson & Waite, 726 W. Russell St., San Antonio, under **$50,000.** CD 10/29.

Tex., Angleton—OIL WELL—J. A. Fite, et al. c/o No. 1 Prison Farms Test, Angleton, drilling, casing, developing deep test oil well, to Christian-Carpenter Drilling Co., Esperson Bldg., Houston, **$80,000.** CD 11/10—ENR 11/12.

Tex., Gail—OIL WELL—R. Lee and H. L. Hunt, Tower Petroleum Bldg., Dallas, drilling, casing, completely developing 4,200 ft. deep test oil well, to Helmerich & Payne, Philtower Bldg., Tulsa, Okla., **$65,000.** Est. $70,000. CD 11/11.

Tex., Petrolia—OIL WELLS—J. A. Chapman, 1744 E. 29 St., Tulsa, Okla., drilling, casing, developing 4 deep test oil wells (R. P. Cobb Survey, Abstract 978), near here. Owner builds. **$110,000.**

Tex., Sterling City—OIL WELL—Ohio Oil Co., Sterling City, 6,500 ft. deep test oil well, force account, **$75,000.**

Tex., Victoria — OIL WELL — Rowan & Hope, Victoria, drilling, casing, developing 6,500 ft. deep test oil well (Valentin Garcia grant. Owner builds. **$48,000.**

Tex., Wharton — OIL WELL — Franklin & Tideman, Blodgett St., Houston, drilling, casing, developing 6,000 ft. deep test oil well, near here. Owner builds. **$52,000.**

†Utah—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., Tooele Co., to Harrison & Dorman, Interurban Bldg., Salt Lake City, under **$50,000.** Bids 10/16.

†Utah—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., Tooele Co., to Pacific Rock & Gravel Co., 208 W. 8 St., Los Angeles, Calif., **$100,000-$500,000.** Bids 10/29.

†Utah—RAILROAD— U. S. Eng., 32 Exchange Pl., Salt Lake City, railroad, Tooele Co., to Utah Constr. Co., First Security Bank Bldg., Ogden, **$100,000-$500,000.** Bids 10/26.

†Utah—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., concrete paving, Weber Co., to V. M. Samuels, 721 First Security Bank Bldg., Ogden, **$100,000-$500,000.** Bids 10/30.

Vt., Burlington—IMPROVEMENTS — Northeastern Airlines, Inc., 137 St. Paul St., imprvs., to H. P. Cummings Constr. Co., 14 Prospect St., Ware, Mass., **$101,500.** CD 8/25—ENR 8/27.

†Washington — IMPROVEMENTS — U. S. Eng., 800 3 Ave., Seattle, imprvs., Spokane Co., to Hawkins & Armstrong, 5265 16 St. NE., Seattle, **$100,000-$500,000.**

†Washington—IMPROVEMENTS—U. S. Eng., Pittock Blk., Portland, Ore., imprvs., Walla Walla Co., to Leonard & Slate, Multnomah, Ore., **$100,000-$500,000.**

LATIN AMERICA

Brazil—Government of Brazil, Rio de Janeiro, plans developing Itabira Iron Mines, rehabilitating Victoria Minas R.R., incl. installations, rail connections, dock works. President Vargas of Brazil, signed decree making official an agreement between Companhia do Vale do Rio Doce and Export-Import Bank of Washington, D. C., for credit of $14,000,000.

Colombia, Bogota—Colombian Government, Bogota, awarded design and construction management ammonia soda process plant, to H. K. Ferguson Co., 1650 Hanna Bldg., Cleveland, O. est. $2,000,000.

Mexico—Kansas City, Mexico & Oriente R.R., c/o M. A. Camacho, secy. Communications & P. Wks. of Mexico, Mexico City, plans new 160 mi. rail link from Creel, Chihuahua, to San Pedro, Sinaloa and plans extensive imprvs. over entire line from Chihuahua to Gulf of California; new shops, roundhouse will be built at Los Mochis, near Pacific coast.

Mexico—Scrita. de A. P. Mexico, D. F., Dr. Gustavo Baz, plans 300 bed hospital at **Muzatlan, Sinaloa,** $105,000; National Railways, Bolivar and 5 de Mayo, Mexico, D. F., plans model home colony for workers of National Railways, **Puebla City, Puebla,** $310,000.

Uruguay — Uruguayan Comn. of Public Works, approved construction of airport at Carrasco. 7,000,000 pesos (approximately $3,680,832) to be raised by an issue of government bonds.

Venezuela—Government of Venezuela, Caracas, plans public works program, incl. roads, hospitals, sewerage sys., port facilities, etc. $20,000,000 credit from Export-Import Bank of Washington, D. C.

PUBLIC BUILDINGS

PROPOSED WORK

★**†Alabama**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., bids soon dwell-

Why don't **more** technical men become executives?

Why are non-technical men so often chosen for executive positions in preference to technical men?

You probably have heard technical men say that industry too often reserves the responsible, high-salaried executive positions for non-technical men who, if faced with the least of your technical problems, would be helpless.

True, industry often does reserve its key executive positions for non-technical men. It does so because the men it selects have something that few engineers possess: a thorough knowledge of the fundamentals which underlie all business and industry.

There is no reason why technical men cannot know these business principles as well as they know engineering principles. Many of them *do* have the vision and foresight to broaden their knowledge; they acquire an understanding of finance, selling, transportation, personnel relations, business organization, and *all* the other vital activities of business.

Alert Engineers Equip Themselves for Today's Opportunities

134,000 men on the operating side of business—more than 37,500 of whom are technical men—engineers, chemists, metallurgists—have found that the Alexander Hamilton Institute's intensive executive training can give them, in a matter of months, the business training essential to supplement their technical skill.

This training, designed to fit into the most crowded working schedule, is for the man who recognizes the present opportunity to carry on to a high executive position today, and promised security after the War.

For there is opportunity today!

Opportunity in the vastly expanded war industries which must produce—and produce now! Opportunity for executive engineers—*engineers with business training*; engineers who can *lead* engineers and earn a high executive salary.

Business and Industrial Leaders Can Help You

The Institute's up-to-the-minute training program has been evolved only through the cooperation of high-ranking business and industrial leaders who contribute to the Institute plan. You can be guided and helped immeasurably by taking advantage *now* of the experiences, methods, and ideas of such successful men as Frederick W. Pickard, Vice President, E. I. du Pont de Nemours & Co.; Thomas J. Watson, President, International Business Machines Corp.; James D. Mooney, President, General Motors Overseas Corp.; Clifton Slusser, Vice President, Goodyear Tire and Rubber Co., and Colby M. Chester, Chairman of the Board, General Foods Corp.

A Book Every Engineer Should Have

The facts about the Institute's intensive executive training program and how it can help you achieve really worthwhile success have been condensed for busy men into a 64-page book called "Forging Ahead in Business." This famous little book tells you just what you need to know in order to become an executive. It tells you about the experiences of other men just like yourself. It gives names, facts and figures.

If you want to read this valuable little book, we should be glad to send you a copy without cost. Simply fill in and mail the attached coupon today and your copy of "Forging Ahead in Business" will reach you by return mail.

ALEXANDER HAMILTON INSTITUTE

Alexander Hamilton Institute, Inc.
54 West 24th Street, New York, N. Y.
In Canada, 54 Wellington St., West, Toronto, Ontario

Please mail me without cost a copy of the 64-page book—"FORGING AHEAD IN BUSINESS."

Name ....

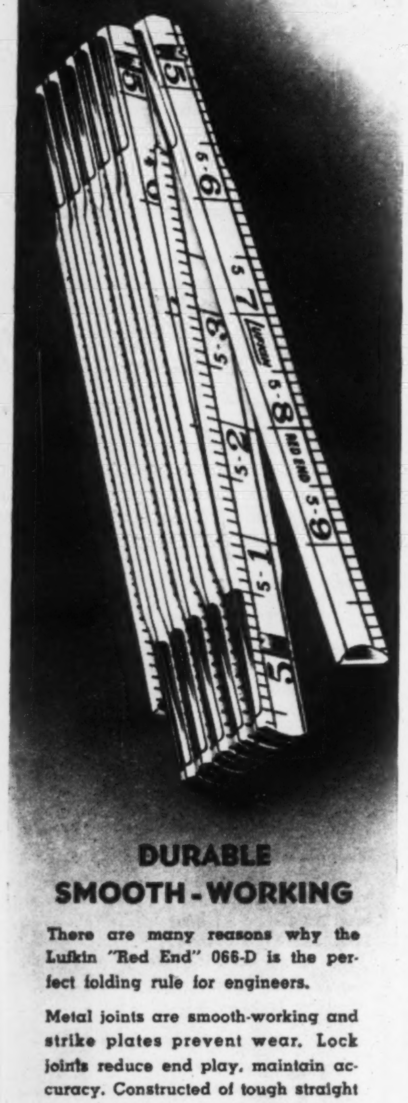
Business Address ....

....

Position ....

Home Address ....

LUFKIN 066-D
ENGINEERS RULE



DURABLE
SMOOTH-WORKING

There are many reasons why the Lufkin "Red End" 066-D is the perfect folding rule for engineers.

Metal joints are smooth-working and strike plates prevent wear. Lock joints reduce end play, maintain accuracy. Constructed of tough straight grain, selected hardwood with durable white enamel finish. Marked engineer's graduations one side, 16ths other side.

See your dealer and write for complete Lufkin catalog.

LUFKIN
SAGINAW, MICHIGAN • New York City
TAPES · RULES · PRECISION TOOLS

PUBLIC BLDGS. (Proposed Work, Cont'd.)

ing units, Ala. 1142. Plans deposit $50. Howard A. Griffith, Jr., 204 E. 4 St., Sheffield, archt.

★†**District of Columbia** — Pub. Bldgs., Admin., North Interior Bldg., Wash., D. C., 1,891 unit housing, West Potomac Park, DC-49041.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 146 unit housing, Syphox Houses, DC-49036, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 138 unit housing, Benning Rd., DC-49037, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 75 unit housing, 35 St., DC-49038, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 168 unit housing, Foote St., DC-49039, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 90 unit housing, Monroe St., DC-49040, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 36 unit housing, 21 St., DC-49044, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St., N.W., 32 unit housing, Bryant St., DC-49053, for NHA.

†**D. C., Wash.**—Alley Dwelling Auth., 1737 L St. N.W., 123 unit housing, Fort Drive, DC-49056, for NHA.

†**California**— Bureau Reclamation, Custom House, Denver, Colo., cancelled bids to have been opened Nov. 2, pier-nose columns, etc., Keswick Power Plant, Kennett Div., Central Valley Project, Spec. 1672. CD 10/16—ENR 10/22.

†**California**—Marin County Housing Auth., G. Ciocca, exec.-dir., Cheda Bldg., San Rafael, plans by F. H. Meyer, Kohl Bldg., and R. I. Stringham, 525 Market St., San Francisco, housing, incl. cafeteria, community hall and store bldg., Proj. Cal-4062, for NHA.

★†**Fla., Key West** — Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 400 family units, Fla. 8075; 224 dormitory apartments, Fla. 8076.

★†**Ill., Brookfield**—Pub. Housing Auth., NHA, 207 N. Wells St., Chicago, housing units. Zook & Taylor, 140 S. Dearborn St., Chicago, archts.

†**Indiana**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant facilities, Metal Door & Trim Co., La Porte, will operate.

†**Kansas**—Pub. Housing Auth., NHA, Dierks Bldg., Kansas City, Mo., maintenance and managers bldg.

★†**Louisiana**—Higgins Industries, Inc., 521 City Park Ave., bldg. $30,000,000. Federally financed.

★†**Maryland**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. Over $1,250,000. Maryland Sanitary Manufacturing Corp., 4500 E. Lombard St., Baltimore, will operate.

★†**Maryland**—Alley Dwelling Auth., 1737 L St. N.W., Wash., D. C., 315 unit Carry Houses, Md-18083, for NHA.

★†**Maryland**—Alley Dwelling Auth., 1737 L St. N.W., Wash., D. C., 238 unit housing, Fairway Tract, MD-18085, for NHA.

★†**Maryland**—Alley Dwelling Auth., 1737 L St. N.W., Wash., D. C., 333 unit housing, Phillips Tract, Md.-18086, for NHA.

★†**Md., Bethesda (br. Washington P. O.)**—Alley Dwelling Auth., 1737 L St. N.W., Wash., D. C., 280 unit housing, MD-18221, for NHA.

†**Massachusetts**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. Over $175,000. Wico Electric Co., West Springfield, will operate.

★†**Nebraska**—Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., dwelling units and dormitory unit housing. $1,000,000.

†**New York**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant facilities. Over $400,000. Odenbach Shipbuilding Corp., Rochester, will operate.

★†**New York**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., addnl. plant facilities. Over $650,000. Republic Steel Corp., Republic Bldg., Cleveland, O., will operate.

★†**N. Y., Elmira**—Pub. Housing Auth., NHA, 270 Bway., New York, 400 dormitory apartments, N.Y. 30043. CD 9/16—ENR 9/24.

★†**N. Y., Niagara Falls**—Niagara Falls Housing Auth., 1,200 unit temporary housing NY-30131; 500 unit temporary housing, NY-30133, for NHA.

†**N. Y., Utica**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 150 dormitory apartments, N.Y. 30092.

†**N. C., Goldsboro**—Federal Works Agency, 606 State Planters Bldg., Richmond, Va., recreational facilities, exten. 2 community bldgs. $57,780 FWA gr.

STERLING
HOISTS

STERLING QUALITY

YOU'LL GET BETTER RESULTS WITH STERLING
• WRITE FOR LITERATURE

Simple, Dependable, Rugged—Sterling Hoists, Pumps, Light Plants are the choice of leading users.

STERLING
MACHINERY CORP.
405-13 Southwest Blvd., Kansas City, Mo.

SPEED SPEED SPEED!

WITH VIBER VIBRATION

Viber Vibrators are being used on wartime construction because they mean better concrete faster! No matter what type of concrete work you do, there is a type of Viber Vibrator made for that type of work. Interchangeable equipment, for gas, electric and air-operation, still further reduces costs.

NEW FEATURES
"GAS" VIBRATOR

Mercury clutch, entirely automatic, picks up load at 1500 r.p.m. allowing engine to idle without running vibrator, eliminates stalling, makes starting easy in cold weather.

Upsetting is practically eliminated in mounting. Handles allow complete unit to be easily carried.

• NEW CATALOG describing new line of modern Viber Vibrators sent on request. Write for it today.

VIBER COMPANY
726 SO. FLOWER STREET
BURBANK, CALIFORNIA

The
PHOENIX BRIDGE CO.
BRIDGES and BUILDINGS
General Office and Works
Phoenixville, Pa.
District Offices
New York, N.Y. Boston, Mass.
Washington, D. C.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**†N. C., Holly Ridge**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 250 housing units, N.C. 31077.

Nev., Las Vegas — Bd. Trustees Clark Co. Hospital, Las Vegas, plans by M. L. Barker and G. Lawrence Ott, 624 S. La Brea Ave., Los Angeles, Calif. 1 and 2 story rein.-con., masonry contsruction hospital.

†Oregon—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., plans by V. E. Bailey, 711 S.W. Columbia St., Portland, housing, Clatsop Co. $80,000.

★**†Oregon**—U. S. Eng., Pittock Blk, Portland, bids soon, bldgs., Deschutes Co. $4,000,000.

★**†Oregon**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., housing, Jackson Co. $500.000.

★**†Oregon-Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., 1,800 unit housing, Ore. 35059; 448 dormitory apartments, Ore. 35091; 200 family units, Ore. 35092; 64 dormitory apartments, Ore. 35093.

†Pennsylvania — Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant facilities. Over $275,000. Erie Resistor Corp., 644 W. 12 St., Erie, will operate.

†Pennsylvania—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant addn. and interior and exterior alterations, Fayette Co., Park & Tilford Distiller, Inc., R. Handrew, in charge, 405 5 Ave., New York, N. Y., will operate.

★**†Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., indefinitely postponed bids to have been opened Nov. 12, demountable housing, Pa. 36254. CD 10/29—ENR 11/5.

★**†Pa., Sharon-Farrell**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 380 unit housing, Pa. 36371.

★**†Texas**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., addnl. plant facilities. Over $600,000. Continental Motors Corp., 12801 E. Jefferson St., Detroit, Mich., will operate.

★**†Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, temporary dormitory apartments, and family dwellings, Rutherford Co.

†Virginia—Defense Plant Corp., 811 Vermont Ave., N.W., Wash., D. C., addnl. plant facilities. Over $300,000. Universal Moulded Products Corp., 570 Lexington Ave., New York, N. Y., will operate.

†Va., Arlington—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 100 unit housing, VA-44232.

★**†Wash., Bremerton**—Bremerton Housing Auth., Bremerton, 250 unit housing, Wash-45144, 100 unit housing Wash-45145, for NHA. CD 10/26—ENR 10/29.

★**†Wash., Port Orchard**—Port Orchard Housing Auth., Port Orchard, 2,650 unit housing, Wash-45147, for NHA. CD 11/4—ENR 11/12.

★**†Washington**—Seattle Housing Auth., 919 Spruce St., Seattle, housing, King Co., for NHA. $8,000,000.

†Washington—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, dormitory, Kitsap Co., for Navy Dpt. P. B. Johanson, archt. and E. G. Duffy, engr., both Smith Tower Bldg., Seattle.

†Wash., Bremerton—Federal Works Agency, Alaska Bldg., Seattle, plans by Naramore & Brady, Dexter Horton Bldg., Seattle, and bids soon school, Sheridan Park, near here. $40,000.

★**†Washington**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, housing units, Pierce Co. $1,200,000.

†Pacific Northwest—U. S. Eng., 800 3 Ave., Seattle, Wash., bldgs., Inv. 241.

BIDS ASKED

Bids Asked November 23

†Maryland—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts., N.W., Wash., D. C., housing, Md. 18191. Extended date. CD 11/12 under BA—ENR 11/12.

†O., Dayton — Federal Works Agency, at office of Good Samaritan Hospital, 1425 W. Fairview Ave., 3 story, bsmnt., 50x130 ft., brick hospital addn., concrete fdn., for Good Samaritan Hospital. $239,000. **FWA.** Schenck & Williams, 3rd Natl. Bank Bldg., archts. CD 3/12—ENR 3/19.

Bids Asked About November 23

†D. C., Wash.—Alley Dwelling Auth., 1737 L St. N.W., demountable housing, DC-49060, for NHA. CD 11/2—ENR 11/5.

Bids Asked After November 23

Ill., Lincolnwood (P. O. Morton Grove)—Bd. Educ., grade school. $150,000. John D. Chubb, 109 N. Dearborn St., Chicago, archt. CD 10/14—ENR 10/29.

Bids Asked November 24

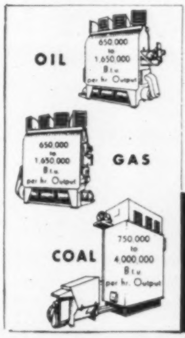
D. C., Wash.—District Comrs., District Bldg., watermains for Parkside Dwellings, Kenilworth Ave., Hayes and Foote Sts. N.E. $65,000.

SAVING 350 TONS for—
WITH DRAVO DIRECT FIRED HEATERS

TABULATION of Weights of one recent heating job showed that a Dravo Direct Fired system required 350 tons less of vital metals than would be required for a conventional heating plant!

A few years ago a steam plant and distributing system for heat were practically foregone conclusions when plans for industrial buildings were formulated. Today heat produced direct by Dravo Heaters has been proved to be more, economical of materials—manhours—money—and time! It's easier to get materials when you can prove this!

Acceptance and increased use of the Dravo Direct Fired method of heating industrial buildings over the last 10 years merit the thoughtful consideration of anyone—architect—consultant—heating engineer—plant owner—purchasing agent—anyone who has anything to say about specifying or purchasing heating equipment for needed war production plants.


OIL
650,000 to 1,650,000 Btu per hr. Output
GAS
650,000 to 1,650,000 Btu per hr. Output
COAL
750,000 to 4,000,000 Btu per hr. Output

Complete description of construction and function of Dravo Direct Fired Heaters as well as comparison table showing savings they offer in weight, floor space and fuel consumption, will be found in Dravo Bulletin No. 506, available upon request.

DRAVO CORPORATION
HEATER DEPARTMENT
Sales Offices in Principal Cities
DRAVO BUILDING PITTSBURGH, PA.

WILLIAMS *Buckets*

WELDED ROLLED STEEL CONSTRUCTION

All types and capacities for all conditions. Send for Catalog.

THE WELLMAN ENGINEERING COMPANY
7000 Central Ave.
Cleveland, Ohio

built by **WELLMAN**

EPPINGER AND RUSSELL Co.

Wood Preservers Since 1878

All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or

DU PONT CZC Chromated Zinc Chloride

80 EIGHTH AVE., NEW YORK, N. Y.

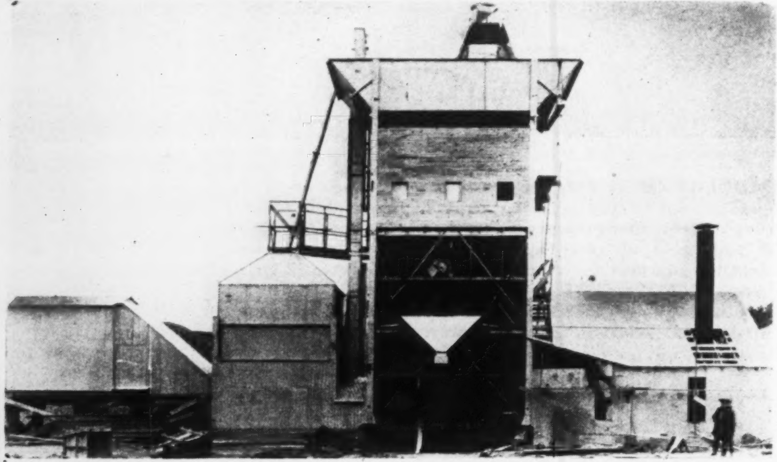
POLES, CROSS ARMS, PILING, TIES
POSTS, BRIDGE AND DOCK TIMBERS

TREATING PLANTS
Jacksonville, Fla. Long Island City, N. Y.

Fast, Dependable
SHOVELS, CRANES
DRAGLINES, BACK HOES
Crawler or Truck—Gas or Diesel
10 Models of 3/4-5/8-1/2-3/8 cu. yd.
THE BYERS MACHINE COMPANY
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

BELMONT IRON WORKS
PHILADELPHIA ROYERSFORD EDDYSTONE
Fabricators *Contractors*
Exporters
STRUCTURAL STEEL
BUILDING & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING
CHANNEL FLOOR
Main Office
Philadelphia, Pa.
44 Whitehall St.
New York Office

BULK CEMENT HANDLING—II
SUPPLEMENTARY GROUND STORAGE



(a) Where cement capacity of 1000 to 3000 barrels is needed, a storage bin at ground level is often indicated in addition to the cement compartment of the batching bin. It is filled by an overflow from the batching bin, and the screw conveyor which loads the entire plant recirculates the cement as required. This system is efficient and very economical. Consult Butler about the best way to handle cement on *your* job.

BUTLER BIN COMPANY
WAUKESHA WISCONSIN

BRITTIN BRACKETS SAVE MONEY
In building SCAFFOLDS —HORSES
Dismantled by slipping legs out of bracket.
Minimum storage and drayage. Bracing unnecessary—set up quickly—strong—safe—guaranteed.
Your demands promptly fulfilled.
EDWARD B. BRITTIN
412 So. 7th St., Res., Springfield, Ill.
5420 Connecticut Ave., Washington, D. C.

DRILLING
ANYWHERE
We look into the earth
PENNSYLVANIA DRILLING COMPANY
PITTSBURGH, PA.

PUBLIC BLDGS. (Bids Asked, Cont'd.)

Bids Asked After November 24

★**†Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., temporary dwellings, Pa. 36362. Davis & Dunlap, 1717 Sansom St., Willing Sims & Talbutt, Architects Bldg., all Phila., archts.

★**†Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 250 temporary dwellings, Pa.-36257. Morton Keast and J. R. Carroll, Commonwealth Bldg., archts. CD 11/5—ENR 11/12.

★**†Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 740 temporary dwellings, Pa.-36255. W. H. Lee, Henry D. Dagie & Sons and V. Abel, Schaff Bldg., Phila., archts. CD 11/5—ENR 11/12.

★**†Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 700 temporary dwellings, Pa-36253. G. S. Idell, L. H. Shay, Demchick & Supowitz, 151[illegible] Chestnut St., archts. CD 11/5—ENR 11/12.

★**†Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 250 temporary dwellings, Pa. 36017. E. F. Simon, Fidelity Bldg., archt. CD 11/5—ENR 11/12.

Bids Asked November 26

†District of Columbia—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., housing, Project DC-1-12.

†District of Columbia—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., housing, DC-1-12. L. Justement, 1223 Connecticut Ave., archt.

Bids Asked November 27

†Illinois—Decatur Housing Auth., Decatur, housing, Projects Ill-11171 and 11172, for NHA. Plans deposit $25. Aschuer & Waggoner, Citizens Bank Bldg., Decatur, archts. CD 10/19—ENR 10/22.

†N. C., Wilson — Federal Works Agency, Candler Bldg., Atlanta, Ga., altering and constructing post office addns.

★**†Virginia**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts N.W., Wash., D. C., 1,080 unit demountable housing, Va-44019. Extended date. Murphy & Locraft, 1413 H St. N.W., Wash., D. C., archts. CD 11/2—ENR 11/5 under BA.

†Virginia—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., housing, Va-44231. Extended date. Heaton & Chatelain, 1211 Connecticut Ave. N.W., Wash., D. C., archts. CD 11/2—ENR 11/5.

★**†Va, Columbia Pike**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 500 unit demountable housing, Proj. VA.-44018. Extended date. Faulkner & Kingsburg, 917 15 St. N.W., Wash., D. C., archts. CD 11/2—ENR 11/5.

Bids Asked November 30

†Kansas—Pub. Housing Auth., NHA, Dierks Bldg., Kansas City, Mo., masonry roadside bins, telephone stations, bridges, road culverts.

★**†Pa., Pottstown** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 300 temporary dwellings, Pa-36341. Stopper & Lichty, Liberty Trust Bldg., Broad and Arch Sts., Phila., archts.

★**†Washington**—Everett Housing Auth., Everett, permanent housing, for NHA. $1,000,000. CD 11/10—ENR 11/12.

★**†Wyoming** — Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., housing, incl. excav., grading, gas, water, sewer, overhead wiring, admin. bldg., service bldg., fire sta., lawns, planting, etc., Wyo-48011. Extended date. Fisher & Fisher, Denver Natl. Bank Bldg., Denver, Colo., archt.-engrs. CD 11/2—ENR 11/5.

Bids Asked After November 30

★**†N. J., Camden**—Public Housing Auth., NHA, 270 Bway., New York, N. Y., 220 permanent dwellings, NJ-28045. F. H. Radey, 101 N. 7 St., archt. CD 10/19—ENR 10/22.

Bids Asked Late November or in December

†Mo., Pattonville—School Dist. of Pattonville, c/o superintendent, St. Charles Rock Rd. (U.S. No. 40), west of Adie Rd., school addns., Docket Mo. 23-152. $15,200 **FWA** gr. Bonsack & Pearce, Inc., 408 Olive St., St Louis, archts. CD 3/27—ENR 4/2.

Bids Asked December 1

†Calif., Palm City—Public Bldgs. Admin., North Interior Bldg., Wash., D. C., school, Docket 4-913. **FWA.**

Bids Asked About December 1

†D. C., Wash.—Alley Dwelling Auth., 1737 L St. N.W., housing, DC-1-6, for NHA. CD 11/2—ENR 11/5.

Bids Asked After December 1

†Pennsylvania—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., dwellings, Pa.-36109. Joseph E. Hoover & Associates, 201 County Office Bldg., Pittsburgh, Pa., archts. CD 11/11—ENR 10/29.

★**†Pa., Pittsburgh** — Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 500 permanent dwellings, Pa.-36107. Mitchell & Ritchey, 617 Wm. Penn Way, Pittsburgh, archts. CD 10/19—ENR 10/22.

PUBLIC BLDGS. (Bids Asked, Cont'd.)

Bids Asked About December 5

★ **†North Carolina** — Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., housing. $5,000,000-$6,000,000. Lynch & Foard, 202½ Princess St., Wilmington, and Dietrick & Olsen, 115 W. Morgan St., Raleigh, archts. CD 11/4—ENR 11/12.

Bids Asked After December 5

†Pa., Upland—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 150 permanent dwellings, **Pa-36268.** Gleeson & Mulrooney, 1612 Market St., archts.

Bids Asked After December 7

★ **†Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., permanent dwellings, **Pa-36363.** Louis Magaziner, F. E. Hah, S. **Abramson** and office of Horace Trumbauer, 1701 **Walnut** St., Phila., archts. CD 11/11.

Bids Asked After December 11

★ **†Pennsylvania**—Pub. Housing Auth. NHA, 270 Bway., New York, N. Y., permanent dwellings, Pa. 36172. Smithyman & Braziell, Magee Bldg., Pittsburgh, archts. CD 11/11—ENR 11/12.

Bids Asked December 15

†District of Columbia—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., housing, Project DC 1-6. G. Howe, Bulletin Bldg., Phila., Pa., archt.

Bids Asked

★ **†Arkansas** — Pub. Housing Auth., NHA, Electric Bldg., Fort Worth, Tex., demountable units staff housing, Ark. 3061; permanent unit housing, Ark. 3062; dormitory units, **Ark. 3063.** CD 10/12—ENR 10/15.

†Ill., Wilmington—Federal Works Agency, 20 N. Wacker Dr., Chicago, 2 portable school bldgs., Ill. 11-227. $60,000. Zook & Taylor, 140 S. **Dearborn** St., Chicago, Ill., archts. CD 11/5—ENR 11/12.

†Massachusetts—U. S. Eng., Park Sq. Bldg., Boston, (selected bidders) altering bldgs., No. 175-43-**NEG 143,** Essex Co.

†Massachusetts—U. S. Eng., Park Square Bldg., Boston, (selected list bidders) altering temporary bldgs., No. 175-43-NEG 144, Suffolk Co.

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., bldgs., Solic. 257-43-130, Kiowa Co. $150,000. Plans deposit $50.

★ **†Texas**—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, frame dwellings. $750,000. Plans deposit $75. CD 10/20—ENR 10/29.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bldg., Tom Green Co. $75,000. Plans deposit $25.

LOW BIDDERS

†California — U. S. Eng., 4792 Sepulveda Blvd., San Bernardino, Nov. 5, housing, Sol. 910, San Bernardino Co., from O'Neal & Headburg, 852 S. Robertson Blvd., Los Angeles, less than **$500,000.**

†California — Dpt. Agriculture, Emergency Rubber Project, 200 Platt Bldg., San Bernardino, Nov. 10, constructing housing, etc., Bid 43, from J. H. Roth Constr. Co., 6028 Whittier Blvd., Los Angeles, **$155,103.**

†California—Housing Auth. Contra Costa Co., Nov. 12, bldgs., sanitary facilities, utilities for automobile trailers, for NHA, from S. J. Amoroso Constr. Co., 2136 Alemany Blvd., San Francisco, **$405,000.** CD 11/10.

†California—Richmond Housing Auth., Nov. 12, bldgs., sanitary facilities, utilities for automobile trailers, for NHA, from S. J. Amoroso Constr. Co., 2136 Alemany Blvd., San Francisco, **$231,000.** CD 11/10.

†Maryland—U. S. Eng., Edgewood, Nov. 9, miscellaneous bldgs., Harford Co., from H. B. Alexander, 3 and Vaughn Sts., Harrisburg, Pa., **$100,000-$500,000.** CD 11/5.

†Nevada—U. S. Eng., 4792 Sepulveda Bldg., San Bernardino, Calif., Nov. 5, bldg., Solic. 65C, Clark Co., from C. B. Bagnall, 2908 Via La Selva, Palos Verdes, Calif., less than **$50,000.** CD 10/29.

†Nevada—U. S. Eng., 2nd Regional Office, 4550 Brazil St., Los Angeles, Calif., construction, installing heating sys. in bldgs., Solic. 68B, Nye Co., from O. J. Senum, 2646 29 St., Santa Monica, Calif., under **$50,000.**

★ **†New York**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., Nov. 6, permanent housing, NY 30083, from A. J. Paretta Constr. Co., Inc., 43-49 45 St., Long Island City, **$613,620.** CD 10/1—ENR 10/8.

★ **†New York**—Buffalo Municipal Housing Auth., 392 Perry St., Buffalo, Nov. 12, housing, Proj. NY 2-4, for NHA, from American Store Equip. & Constr. Co., 461 8 Ave., New York, N. Y., **(1) $1,224,511 (2) $1,249,000.** CD 10/26—ENR 10/29 under BA.

†N. C., Jacksonville—Onslow Co. Bd. Comrs. and Federal Works Agency, 606 State Planters Bldg., Richmond, Va., Nov. 10, 50 bed hospital, nurses' home and health center, NC-31-164, from G. W. Kane, Greensboro, **$246,524. FWA.** CD 10/20—ENR 10/22.

For More Than 20 YEARS
"CLEVELANDS"
Have Been Delivering More Trench with Less Work and At Lower Cost On Hundreds of Pipeline Jobs.

Today "CLEVELAND"
Is Proud to be Serving Our Military and Naval Services On Many War Emergency Projects.

PUT "CLEVELANDS" ON YOUR WAR EMERGENCY TRENCHING JOBS for:—

- Oil
- Gas
- Gasoline
- Sewer
- Water
- Telephone
- Power
- Building Foundations

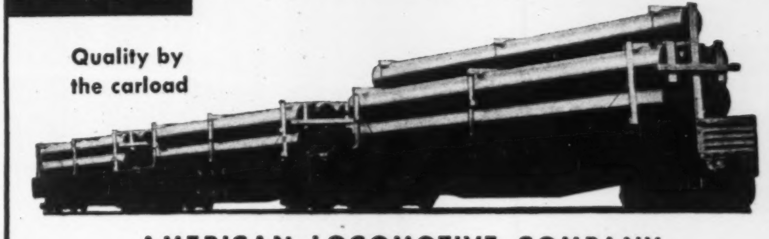
In today's pipeline construction programs, Speed, Endurance, Low Cost operation and Service are the most essential machine requirements. That's why "CLEVELANDS" fit so perfectly into the picture and are preferred equipment on so many war and civilian emergency projects, current and recent.

Geared to the job "CLEVELANDS" are delivering maximum performance, day in and day out, at rock bottom costs.

THE CLEVELAND TRENCHER CO.
"Pioneer of the Small Trencher"
20100 ST. CLAIR AVE. • CLEVELAND, OHIO

"CLEVELANDS" Save More . . . Because they Do More

ALCO ELECTRIC WELDED STEEL PIPE



AMERICAN LOCOMOTIVE COMPANY
ALCO PRODUCTS DIVISION
NEW YORK, N. Y. DUNKIRK, N. Y.

VULCAN
PILE
HAMMERS
Do Fast
Driving in
AMERICA'S
VICTORY
DRIVE

★ Picture shows Warrington-Vulcan Single Acting Pile Hammer driving reinforced concrete piles 20"x24"x72 feet long from floating derrick for harbor wall. The longest piles driven on this job weree 93 feet long. Sizes, 0—1—2—3—4. The SUPER-VULCAN Differential-Acting Open-Type Pile Hammer fits the same leads and uses the same accessories as the Warrington-Vulcan. Sizes 80c, 50c, 30c, 18c.

Added speed in construction is vital today—get it with VULCAN—there are types and sizes for every need—for underwater work use Super-VULCAN Differential-Acting Closed-Type Steam Pile Hammers—for removing old piles of all kinds quickly, use the VULCAN Pile Extractor. We are the largest exclusive manufacturers of pile driving and extracting machinery since 1852. Write for bulletins.

●

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago Illinois

PUBLIC BLDGS. (Low Bidders, Cont'd.)

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, Nov. 4, bldgs., electrical, water distr. and sanitary sewerage sys., streets, road, drainage, Matagorda Co., from Alamo Constr. Co., 1801 Smith Young Tower, San Antonio. CD 10/27.

†Texas—U. S. Eng., Fort Sam Houston, Nov. 11, bldgs., Spec. 42-513, Brown Co., from Ross Constr. Co., Brownwood.

★ **†Texas**—Pub. Housing Auth., NHA, Electric Bldg., 7 and Taylor Sts., Fort Worth, Nov. 13, housing, from Thurman Ostron, Borger, **$885,232.** CD 11/2—ENR 11/5.

CONTRACTS AWARDED

†Alabama—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, bldg., Inv. 569-43-287, Mobile Co., to Paul Smith Constr. Co., 310 N. Rome Ave., Tampa, Fla. Est. **$75,000.**

★ **†Alabama**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., construction-management plant, to Bechtel-McCone-Parsons Corp., 601 W. 5 St., Los Angeles, Calif. Over **$12,500,000.**

†Arkansas—U. S. Eng., 300 Bway., Little Rock, bldg., Pulaski Co., to W. R. Rhodes & Son, Insurance Bldg., Little Rock. CD 10/27.

★ **†California**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant, to H. K. Ferguson Co., 1650 Hanna Bldg., Cleveland, O. Est. over **$1,500,000.** Industrial company will operate.

†California—Industrial Company, storage shop, shop addn., Alameda Co., to Younger Constr. Co., Cheda Bldg., San Anselmo. Federally financed.

†Florida—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., addnl. housing facilities, Okaloosa Co., to Algernon Blair, 1st Natl. Bank Bldg., Montgomery, **$100,000-$500,000.**

†Georgia—U. S. Eng., Post Office, Savannah, bldgs., to Whalley-Strong Constr. Co., 410 E. Bay St., Savannah.

★ **†Georgia**—U. S. Eng., Post Office Bldg., Savannah, addnl. temporary frame bldgs., Richmond Co., to Claussen & Webster, Augusta, **$500,000-$1,000,000.**

★ **†Georgia**—U. S. Eng., Post Office, Savannah, bldgs., Thomas Co., to Fiske Carter Constr. Co., Greenville, S. C., electric distr. sys., to H. B. Nelson Co., Red Rock Bldg., Atlanta***water and sanitary sys., to W. C. Shephard, Braircliff Rd., Atlanta. Est. **$2,000,000.** H. I. Gaines & Associates, Pub. Serv. Bldg., Asheville, N. C., archts. CD 11/4—ENR 11/11.

†Georgia—U. S. Eng., Post Office Bldg., Savannah, 2 warehouses, commissary, SH-9, to Fennell Constr. Co., Gainesville. Bids 11/5.

†Georgia—U. S. Eng., Marietta, bldg., Cobb Co., to A. J. Collins, Red Rock Bldg., Atlanta.

★ **†Ga., Brunswick**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, 1,000 unit dormitory structure, temporary construction, incl. site imprvs., plumbing, heating, electrical and landscape work, GA-9123, to Mion Constr. Co., 377 Techwood Dr., Atlanta, **$538,981** plus fixed fee **$18,000.**

†Illinois—U. S. Eng., 800 U. S. Courthouse & Custom House, St. Louis, Mo., bldg., Negotiation No. 1103-43-86, Madison Co., to Smith-Cooke Constr. Co., 4829 Easton Ave., St. Louis, Mo., **$50,000-$100,000.** Bids 11/7.

†Illinois—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., addnl. housing facilities, St. Clair Co., to Bauer Bros. Constr. & Supply Co., Belleville, **$100,000-$500,000.**

†Illinois—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, Mo., bldgs., utilities, Negotiation No. 1103-43-85, St. Clair Co. to E. F. Marsch Constr. Co., 4030 Chouteau Ave., St. Louis, Mo. Bids 11/6.

Ill., East Moline—State Dpt. P. Wks. & Bldgs., Div. Architecture & Eng., Armory Bldg., Springfield, general contract altering, repairing State Hospital, to Warren B. Ewer Co., Merchandise Market, Chicago, **$189,180** ***heating, ventilating, plumbing, to J. E. Brady Co., 551 15 Ave., Moline **$100,091***** electrical contract, to Wilson Electric Co., 113 S. Madison St., Rockford, **$38,496.** Grand total $327,767. C. H. Herrick, state superv. archt.

★ **†Kansas**—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., 1 and 2 story, frame bldgs., underground utilities, Barton Co., to Northwestern Eng. Co., Rapid City, S. D., **$1,000,000-$5,000,000.**

†Kansas—U. S. Eng., 10 E. 17 St., Kansas City, Mo., 25 executive residences, Douglas Co., to L. O. Stocker Co., 812 Olive St., St. Louis, Mo. Est. under **$500,000.**

★ **†Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, bldg., to Rayne Lumber Co., Inc., Rayne***bldg., to Robert Angelle, Breaux Bridge***bldg., to Perrilliat-Rickey Constr. Co., Inc., 1530 S. Rendon St., New Orleans, and Barber Contg. Co., Reymond Bldg., Baton Rouge***bldg., to Gravier & Harper, Alexandria. Est. under **$1,000,000.** Bids 10/31. CD 10/26.

Quick Steel..

● Your nearby Ryerson plant carries reinforcing bars, structurals, roofing....and practically every form of steel and allied construction products....in stock for immediate shipment.

● The demands of the war program has depleted our stocks in many lines, but we are still able to help in many building requirements. The Ryerson Contractors and Builders Division offers a *complete* service for planning and working out your jobs. Shipments of cut, bent and tagged steels are scheduled to meet your actual day-to-day needs. All construction accessories such as; wire mesh, caisson rings and removable forms.... etc., are shown in our Stock List. Write your Joseph T. Ryerson & Son plant in Chicago, Milwaukee, Cincinnati, St. Louis, Cleveland, Detroit, Buffalo, Boston, Philadelphia, Jersey City

100 YEARS OF RYERSON STEEL SERVICE

RYERSON

DOES THIS STOP YOU?

If this attracts your attention stop and think of the other readers who will also stop and read it. If a product of yours were substituted and your name and address were added this space would be something that your salesmen could capitalize. There are hundreds and hundreds of signatures in *Engineering News-Record's* files that prove unquestionably that these advertising pages receive a lot of attention.

Foundation TESTS of
UNDISTURBED SOIL
in its natural state, position, condition and ASSOCIATION with the
Le Mieux
TRITOMETER
SUBSTRATA ENGINEERS, INC.
Maritime Bldg. New Orleans, La.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

★ **†Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, bldgs., to Mid-State Const. Co., Alexandria, under **$1,000,000.**

★ **†Md., Cedar Point**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., bldgs., Supplementary **Agreement 2, NOY 5363**, to Cummins Constr. Corp., 803 Cathedral St. and Riggs, Distler & Co., 216 N. Calvert St., both Baltimore, **$5,360,000.** Awarded 11/5. Additional to CD 8/26—ENR 3/5 under CA.

†Massachusetts—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., housing, No. 699-43-102, Hampden Co., to J. G. Roy & Sons Co., 21 Silver St., Springfield. Est. **$100,000-$500,000.** Bids 11/6.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, addnl. bldgs., utilities, Barnstable Co., to M. Slotnick Co., 333 Washington St., Boston, **$100,000-$500,000.** CD 11/5—ENR 11/12.

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, lubricating oil storage bldg., skeet range, pistol range and flag pole, Washtenaw Co., to J. A. Utley, Box 6, North End Station, Detroit, less than **$1,000,000.**

★ **†Missouri**—Pub. Housing Auth., NHA, G. Mykland, dir., 1700 Dierks Bldg., Kansas City, demountable, prefabricated housing units, site development work, sanitary and storm sewers, water distr., lawns, planting, Defense Housing Proj. 23028, St. Charles Co., to J. J. Wuellner & Son Constr. Co., Oak and Front Sts., Alton, Ill., **$624,750.** Bids 10/23. CD 10/29—ENR 11/5 under LB.

★ **†New Jersey**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., housing Proj. NJ 28044, to George Colon Contg. Co., 103 E. 125 St., New York, N. Y., **$754,066.** Awarded 11/10. CD 10/22—ENR 10/29.

†New Jersey—U. S. Eng., 120 Wall St., New York, N. Y., frame bldgs., Essex Co., to G. C. Mahieu Constr. Co., 135 Market St., Paterson; electrical work, to Buhl & Caffrey, 39 Hudson St., Newark.

†New Mexico — U. S. Eng., Albuquerque, N. M., bldg., to K. L. House, Albuquerque, **$136,000.** CD 8/26—ENR 9/3.

†New Mexico—U. S. Eng., Albuquerque, temporary frame bldgs., Bernalillo Co., to S. V. Patrick, Albuquerque, **$100,000-$500,000.** CD 10/5.

†New York—U. S. Eng., 120 Wall St., New York, motor repair shop, 2 car-grease rack, incl. utilities, roads, walks, etc., Queens Co., to Roberts Nash Constr. Corp., 39-15 Main St., Flushing, under **$50,000.**

†North Carolina—U. S. Eng., 33 Customhouse, Charleston, S. C., cold storage bldg., Union Co., to W. H. Hand & Son, Belmont, **$50,000-$100,000.**

†North Carolina—U. S. Eng., Charlotte, bldg., Mecklenburg Co., to P. S. West Constr. Co., Statesville. Bids 11/5.

†North Carolina—U. S. Eng., Charlotte, bldg. facilities, Union Co., to J. A. Jones Constr. Co., 209 W. 4 St., Charlotte.

†North Carolina—U. S. Eng., Charlotte, bldgs., Union Co., to J. A. Jones Constr. Co., 209 W 4 St., Charlotte. Bids 11/9.

†North Carolina—U. S. Eng., Charlotte; ice plant, Union Co., to E. Foard, Piedmont Bldg., Charlotte.

★ **†Ohio**—U. S. Eng., Court House, Detroit, Mich., bldgs., Ottawa Co., to Steinle Wolfe, Inc., Fremont, less than **$1,000,000.**

★ **†Ohio**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant, to Hunter Constr. Co., Mahoning Bank Bldg., Youngstown, over **$1,000,000;** all grading work, to Garaux Co., 415 St. S.W., Canton. Republic Steel Corp., Republic Bldg., Cleveland, will operate. CD 11/12.

†Ohio—U. S. Eng., Dayton, warehouses, Greene Co., to Hillsmith & Co., 108 E. 3 St., Dayton, **$100,000-$500,000.**

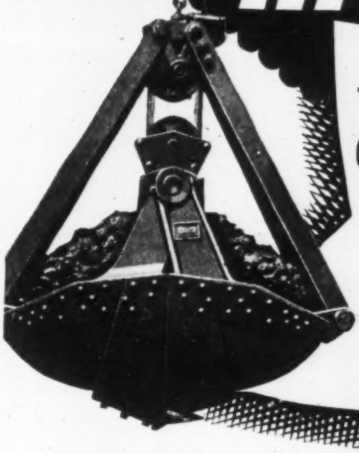
★ **†Ohio**—Lorain Metropolitan Housing Auth., Lorain, housing, for NHA, to Weinstein Constr. Co., 573 E. Talmadge St., Akron, **$937,000.** Awarded 11/6. CD 10/9—ENR 10/15, under LB.

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, bldgs., Alfalfa Co. to Associated Builders, P. O. Box 4156, Oklahoma City, **$100,000-$500,000.**

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, bldg., Oklahoma Co., to Home Improvement Co., 325-B N.W. 10 St., Oklahoma City, under **$50,000.**

★ **†Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, Contr. 3, frame bldgs., water, sanitary sewer, gas lines, etc., to Lovering Constr. Co., 389 8 St., St. Paul, Minn., **$1,000,000-$5,000,000;** Contr. 2, clearing, grading, hard paving, to W. Watson, 1004 Natl. Bank of Topeka Bldg., Topeka, Kan., **$100,000-$500,000*****drainage facilities, to Groves, Lundin & Cox, 907 Wesley Temple Bldg., Minneapolis, Minn., **$50,000-$100,000,** all foregoing Solic. 957-Neg-43-100. Woodward Co.

†South Carolina—U. S. Eng., Fort Jackson, 2 bldgs., Richland Co., to W. M. Fine, Spartanburg. Bids 11/10.



HAISS

FOR BIGGER PAY-LOAD DIGGING

HI-POWER

THE HEAVIEST JAWS OF ANY BUCKET OF ITS KIND...

Giving it a bowl which will stand any amount of battering and still hold its shape...Chisel or Pick-Point Teeth.

Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles... *Write or wire for prices, delivery and catalog details.*

GEORGE HAISS MFG. CO., INC., 139TH ST. & CANAL PL., NEW YORK

FOUNDATIONS

PRETEST UNDERPINNING
CONCRETE-STEEL PILES
MASS CONCRETE CONSTRUCTION
HEAVY SHORING
DRILLED-IN CAISSONS

DRILLED-IN CAISSONS
FOUNDATIONS
UNDERPINNING

Send for catalogs descriptive of the latest foundation types and methods.

SPENCER, WHITE & PRENTIS, INC.
10 EAST 40th ST. NEW YORK, N. Y.

This Winter's Concrete Needs These "Extras"

Extra Speed, Extra Quality, Extra Safety

This winter's concrete schedule calls for speed . . . *but not at the sacrifice of quality or safety!* The addition of Solvay Calcium Chloride to portland cement provides:

1. EXTRA SPEED—halves setting time, provides 3 days' strength in one day . . . 7 days' strength in 3 days when used with either standard or high early cement.
2. EXTRA QUALITY—increases ultimate strength, workability—permits reduction of water-cement ratio, makes denser and more durable waterproof concrete.
3. EXTRA SAFETY — offsets dangerous effects of sudden drops in temperature, shortens protection period, adds extra protection against freezing.

These EXTRA qualities are obtained without changing the normal chemical action of portland cement—and at a cost so low that the savings in finishing, forms, protection and labor far outweigh the cost of calcium chloride.

use SOLVAY CALCIUM CHLORIDE *with all* PORTLAND CEMENT

For Approved, Low Cost, War Time

FIRE PROTECTION

Use Pails, Barrels, Pumps and

SOLVAY CALCIUM CHLORIDE

TRADE MARK REG. U. S. PAT. OFF.

WON'T Freeze Evaporate Deteriorate — Won't Foul, Easy to Prepare, No Maintenance

LOW COST—The cost of Solvay Calcium Chloride solutions ranges from 3¢ to 8¢ per gallon. This means that complete units consisting of pails and solution can be obtained for one dollar or less.

➡ **Quick easy way to end slippery ice!**

. . . on sidewalks, steps, streets, loading platforms, spread clean white flakes of Solvay Calcium Chloride. Loosens ice quickly. Can be swept or shoveled away without chopping. Solvay Calcium Chloride can also be mixed with sand or cinders for skidproofing.

Send for complete information. Write to Dept. 3711

SOLVAY SALES CORPORATION
40 RECTOR STREET NEW YORK, N. Y.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†South Carolina—U. S. Eng., Camp Croft, Bldg. addn.; Spartanburg Co., to Van Winkle & Co., 273 E. Paces Ferry Rd. N.E., Atlanta, Ga.

†South Carolina—U. S. Eng., 33 Customhouse, Charleston, temporary frame bldgs. and roads, Florence Co., to Hubbard Constr. Co., Marion, **$100,000-$500,000.**

★**†Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, bldgs., Coffee Co., to Rock City Const. Co., 135 4 Ave. N., Nashville, under **$1,000,000.**

†Texas—U. S. Eng., 231 W. Main St., Denison, temporary frame bldgs., Bowie Co., to Owens Constr Co., Fort Worth, **$100,000-$500,000.**

★**†Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., to Linbeck & Lederick, 3908 Main St., Houston, **$500,000-$1,000,000.**

★**†Texas**—American Republics Petroleum Co., Petroleum Bldg., Houston, new unit and converting 1 plant, force account and subcontracts. Approx. **$2,300,000.** Federally financed. CD 10/8—ENR 10/15.

†Texas—Industrial Company, plant, to Arthur G. McKee Co., Commerce Bldg., Houston, approx. **$475,000.** Federally financed.

†Texas—Industrial Company, plant, to Arthur G. McKee & Co., Commerce Bldg., Houston, approx. **$450,000.** Federally financed.

†Texas—Pub. Housing Auth., NHA, Electric Bldg., Fort Worth, permanent housing, Tex. 41133, to Clinton Park Constr. Co., 1150 S. Wayside Dr., Houston. CD 10/23—ENR 10/29.

★**†Texas**—Reconstruction Finance Corp., 811 Vermont Ave. N.W., Wash., D. C., plant, to Chemical Constr. Corp., 30 Rockefeller Plaza, New York, N. Y. **$12,000,000.** Brown & Root, Dumas, sub-contractors on entire job.

†Texas—U. S. Eng., Fort Sam Houston, housing. Brown Co., to Loftis & Hudson, 3105 Mockingbird Lane, Dallas, **$100,000-$500,000.**

†Texas—U. S. Eng., 25 St. and Ave. F, Galveston, addnl. bldgs., water and sanitary sewerage sys., Cameron Co., to Hugh T. Ramsey, Harlingen, **$100,000-$500,000.** Bids 11/5, awarded 11/6. CD 10/27—ENR 10/29.

†Texas—U. S. Eng., Fort Sam Houston, bldg., water, sewer, gas lines, Spec. 42-452, to Herridge Co., 417 Truman St., Houston, under **$50,000.** Add. to CD 11/9—ENR 11/12.

†Texas—U. S. Eng., Fort Sam Houston, supplemental addnl. bldg., reconstruction, imprvs., Matagorda Co., to L. V. Miller, 1st Natl. Bank Bldg. Houston, **$100,000-$500,000.** Additional to CD 10/14—ENR 10/22, under CA.

†Texas—U. S. Eng., Fort Sam Houston, bldgs., underground utilities, outside electrical distr. sys., drainage, streets, roads, Matagorda Co., to Alamo Constr. Co., Smith-Young Tower, San Antonio, **$50,000-$100,000.** CD 11/9—ENR 11/12.

†Texas—U. S. Eng., Federal Bldg., Galveston, bldgs., water, sewer, gas lines, drainage, street and road paving, to C. O. Baker, 2402 Alban Rd., Houston, **$100,000-$500,000.** CD 7/15—ENR 7/23.

†Virginia—U. S. Eng., Fort Monroe, dispensary and housing, Warwick Co., to Southeastern Constr. Co., and Goode Constr. Corp., Sandston, Richmond, **$100.000-$500.000.**

★**British Columbia**—Dpt. Natl. Defense for Air, Ottawa, Ont., quarters, mess halls, hangars, at R.C.A.F. Station, to Carter-Halls-Aldinger Co., Ltd., 670 Taylor Bldg., Vancouver, **$1,000,000.**

Newfoundland—Dpt. National Defense for Air, Ottawa, Ont., temporary barracks, officers' quarters, etc., R.C.A.F. Station, to E. G. M Cape & Co., Ltd., 620 Cathcart St., Montreal, Que., **$330,000.**

Ont., Ottawa—Dpt. P. Wks., Ottawa, 2 story, bsmnt., 48x166 ft. with two 42x47 ft. and 49x116 ft. wings, physical metallurgy research laboratory, brick, concrete fdns., to Alex. I. Garvock, Regent Theatre Bldg., Bank and Sparks Sts., about **$206,000.** Est. $175,000-$200,000. C. D. Sutherland, c/o owner and W. E. Noffke, 46 Elgin St., archts. CD 10/27—ENR 10/29.

★**P.E.I., Mount Pleasant**—Dpt. Natl. Defense for Air, Ottawa, Ont., quarters, mess halls, hangars, No. 10 Bombing and Gunnery School, to Tomlinson Constr. Co., Ltd., 21 King St. E., Toronto, Ont., **$1,200,000.** CD 8/21.

Que., Valcartier—Dpt. Natl. Defense, Ottawa, Ont., bldgs., at Dominion Arsenal, to Magloire Cauchon, Ltd., 311 de la Salle St., Quebec City, **$50,000.**

COMMERCIAL BUILDINGS

PROPOSED WORK

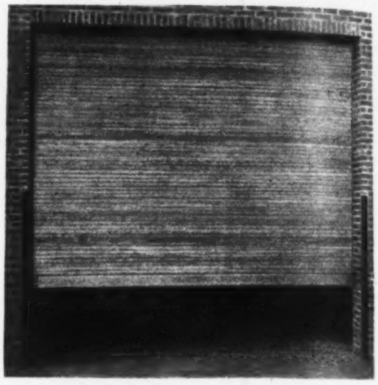
Calif., Orlinda — Netherlands Shipping Mission, 29 Bway., New York, N. Y., Lieut. Comdr. M. S. Wytema and Lieut. Nanno F. De Gront, representatives, Royal Netherlands Navy, San Francisco, soon lets contract altering residence and constructing large dormitory and recreation room, swimming pool. F. H. Slocombe, 132 Monte Cresto Ave., Oakland, archt. CD 7/14—ENR 7/16.

DRILLING CONTRACTORS
DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

Foundation Testing for Bridges, Dams and All Heavy Structures
Also
Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

Steel Rolling Door Efficiency in KINNEAR WOOD ROLLING DOORS



Time-tested, service-proved Kinnear WOOD Rolling Doors are taking the lead in meeting wartime needs—saving steel without sacrificing efficiency. They coil compactly above the lintel, save floor, wall and ceiling space. Ruggedly constructed. Provide full weather protection. Any size; motor, manual, or mechanical operation. Easy to install. Write for bulletin 37. The Kinnear Manufacturing Company, 1820-40 Fields Ave., Columbus, Ohio.

SAVING WAYS IN DOORWAYS KINNEAR ROLLING DOORS

THE MOUNT VERNON BRIDGE CO.
Engineers Contractors
STRUCTURAL STEEL
RAILWAY AND HIGHWAY BRIDGES
BUILDINGS AND VIADUCTS
MOUNT VERNON, OHIO

COMMERCIAL BLDGS. (Proposed Work, Cont'd)

Mass., Southbridge—Hogan Realty Co., c/o John Ho[illegible]n, American Optical Co., Southbridge, 36 frame houses. $162,000.

N. J., Lyndhurst—Berkley Manor Homes, 1895 Billingsley Terrace, New York, N. Y., group 2 story, bsmnt., brick garden apartments. $216,000.

O., Willoughby—William Johnson Constr. Co., Willoughby, 25 homes, Mapledale Allotment, $150,000.

Wash., Spokane—B. Goldstein, N 110 Post St., 35 frame houses, W. 525 7 St., $150,000.

Wis., Delavan—United Home Builders, 3 and Walworth Aves., 55 frame houses.

O., Xenia—Shawnee Development Co., Xenia, 100 houses. $400,000.

CONTRACTS AWARDED

Kan., Lawrence—Wm. F. Shackelford, 7510 Ward Pkway, Kansas City, Mo., 54 frame housing units. Owner builds. Est. **$160,000.** CD 10/2—ENR 10/8.

N. J., Cranford—Cranford Defense Housing Corp., 277 Bway., New York, one hundred 1½ story, frame residences, separate contracts. **$400,000.** CD 7/1—ENR 7/9.

O., Columbus—Capital Investment Co., 22 W. Gay St., thirty-six 2 story, frame dwellings, Park Blvd., Sharon Twp., to Alvin Love, 1830 Waltham Ave., **$150,000.** Awarded 11/11.

O., Columbus—Capital Investment Co., 22 W. Gay St., 26 dwellings, Myrtle Ave., to American Homes Assn., 16 E. Broad St., **$150,000.** Awarded 11/5.

Pa., Latrobe—Latrobe Hospital Assn., R. C. McKenna, pres., 2 Ave., general contract 4 story, bsmnt., 80x132 ft., brick, tile hospital addn., 1 story, part bsmnt., 32x120 ft. power house, laundry, with 100 ft. brick radial stack, to Jos. J. Bendik, 7 Gilmore St., Uniontown ***plumbing, sewers, to Windber Plumbing & Supply Co., Windber***heating, ventilating, to John Hall, Ligonier***electrical work, to Yost Electric Co., 155 Wilson St., Greensburg. Total est. **$400,000.** Bids 11/6. CD 10/21—ENR 10/29.

Tex., Oak Cliff (mail Dallas)—Dallas Defense Homes, Inc., Oak Cliff, 60 frame dwellings, force account. **$175,000.**

Wis., Milwaukee—Security Homes, Inc., c/o Givan Co., 735 N. Water St., 1 story, 24x28 ft. siding on prefabricated houses, concrete block fdn., to Northwest Wood Products Co., Wonewoc. A. H. Siewert, 2309 N. 36 St., archt.

INDUSTRIAL BUILDINGS

PROPOSED WORK

O., Parral (mail Strasburg)—KILN—Robinson Clay Products, Second Natl. Bldg., Akron, kiln. Over $40,000.

Pa., East Butler—FACTORY—Pittsburgh Steel Drum Co., S. Reed, mgr., East Butler, rebuilding brick factory. $150,000.

Wis., Marinette—BOILER HOUSE—Marinette Maritime Corp., plans by Max Hanisch, Stephenson Bldg., 1 story, brick, concrete boiler house.

Alta., Ryley—PLANT—Woodland Dairy Ltd., 9508 108 Ave., Edmonton, plant.

B. C., Kelowna—PLANT—Copper Creek Mercury Mines, Ltd., c/o Bredin & Filmore, 254 Ellis St., mining and smelting plant $75,000.

B. C., Vancouver—PLANT—Aqua Copper Co., Ltd., 736 Granville St., mining plant and bldgs. $50,000.

B. C., Vancouver—PLANT—British Columbia Dextrose Syrup Co., Ltd., 210 Pacific Bldg., mfg. and refining plant.

B. C., Vancouver—MILL—Emory Creek Logging Co., Ltd., 506 Rogors Bldg., shingle saw and planing mill. $50,000.

B. C., Vancouver—PLANT—Millwork Industries, Ltd., 2606 Yew St., plant addn. $45,000.

B. C., Vancouver—FACTORY—J. T. Pyott, Ltd., 470 Granville St., factory.

Que., Beloeil—PLANT—Canadian Industries, Ltd., 1135 Beaver Hall Hill, Montreal, plant exten. $190,000.

Sask., Saskatoon — PLANT — Canada Egg Products Ltd., 445 Ste Helen St., Montreal, Que., plans by Webster & Gilbert, C. P. R. Bldg., remodeling bldg., constructing cold storage plant. $100,000.

Que., Lachine—PLANT—Dominion Bridge Co., Ltd., Lachine, plans by Archibald & Insley, 1440 W. Ste. Catherine St., Montreal, 60x90 ft., rein.-con., brick plant addn. $60,000.

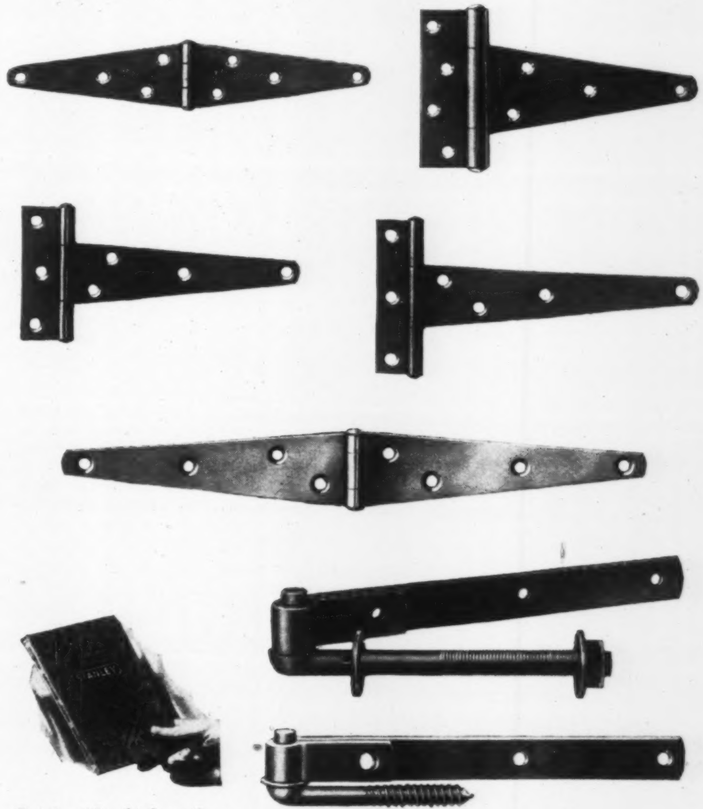
Que., St. Laurent (Postal Dist. Montreal)—LABORATORIES—Rose & McDonald, archts., 1010 St. Catherine St. W., Montreal, bids soon laboratory, 1 story, concrete, brick chemical laboratory, 2 story, brick mfg. and research bldg., for Ayerst, McKenna & Harrison, Ltd., 485 McGill St., Montreal. $117,000. CD 9/25—ENR 10/8.

Que., Trois Pistoles—SAW MILL—Daigle & Paul Ltd., 1962 Galt Ave., Verdun, saw mill.

Full gauge . . . close-fitting joints . . . accurate countersinking

STANLEY STRAP
and T-HINGES

Stanley Strap and T-Hinges are made in all sizes and weights to swing any door.

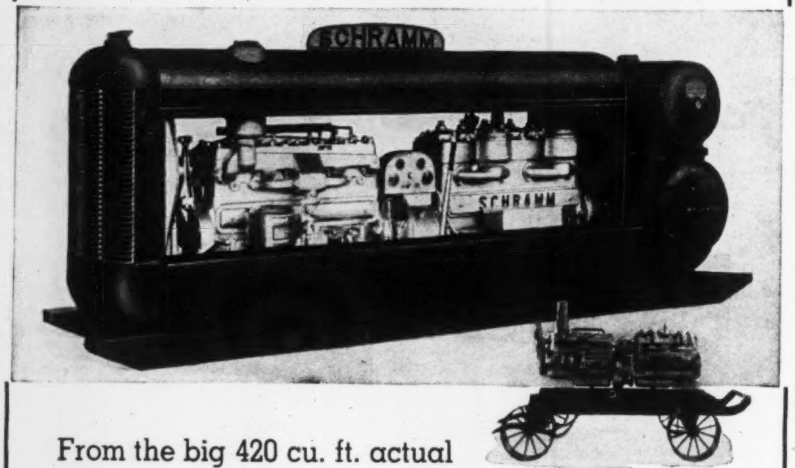


Catalog No. 61 describes the full line of Stanley Hardware for every type of building. Write for a copy. The Stanley Works, New Britain, Connecticut.

STANLEY
TRADE MARK
HARDWARE FOR CAREFREE DOORS

UNDERPINNING &
FOUNDATION CO., Inc
Engineers & Contractors
155 E 44 St., NEW YORK

Easy to Start—
Hard to "Stop"



The rigid, permanently aligned Schramm compressor and engine are mounted into the frame as one complete unit.

From the big 420 cu. ft. actual air compressor to the versatile little 20 cu. ft. every SCHRAMM compressor is a compact package of power—always ready to start at the touch of a button; yet never ready to quit on the toughest jobs. From the Arctic Circle to the Tropics users have found that SCHRAMM all-weather compressors incorporate advantages that assure them of a dependable source of air power with a minimum of attention or servicing.

GASOLINE—DIESEL—ELECTRIC

You know which size, type and drive is best suited for your requirements. SCHRAMM knows best how to build it. For back of every compressor bearing our name are 42 years of engineering and research devoted exclusively to this equipment.

SCHRAMM
PORTABLE AIR COMPRESSORS

SEND TODAY FOR CATALOG 42-P →

SCHRAMM The Compressor People

SCHRAMM, INC.
WEST CHESTER, PA.
DEALERS IN PRINCIPAL CITIES

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

CONTRACTS AWARDED

Calif., Berkeley—PLANT—American Forge Co., 701 Ashby Ave., repairing bldg., to Fire Protection Products Co., 1106 [illegible] St., San Francisco. Est. **$48,000.** CD 12/16—ENR 12/18.

Calif., South San Francisco—PLANT—Western Pipe & Steel Co., South San Francisco, plant, to Carrico & Gautier, 365 Ocean Ave., San Francisco. CD 11/10—ENR 11/12.

★**Ill., Lockport**—PLANT—Texas Co., 332 S Michigan Ave., Chicago, general contract, plant addns., to Foster-Wheeler Corp., 105 W. Adams St., Chicago. Est. **$2,000,000.** CD 2/4—ENR 2/12.

La., Monroe—FACTORY WAREHOUSE—M. K. Leiber, Monroe, factory warehouse, to J. R. White, Monroe, **$40,000.** Awarded 11/6.

La., Monroe—WAREHOUSE—G. S. Lawhead, Monroe, **warehouse**, to Concrete Material Co., Monroe, **$50,000.** Awarded 10/30.

La., Monroe—WAREHOUSE—J. E. Peters, Monroe, **warehouse**, to J. R. White, Monroe, **$40,000.** Awarded 11/6.

Maine—PLANT—Industrial Company, Front St., brick plant unit, to H. P. Cummings Constr. Co., 14 Prospect St., Ware, **Mass.**, **$99,444.** Bids 10/14. CD 10/5—ENR 10/8.

Massachusetts — PLANT — Industrial Company, plant, to Tredennick Billings Co., 10 High St., Boston. CD 10/1—ENR 10/8.

Mass., Chelsea—STORAGE—F. Rabinovitz, 3 Lawrence St., 2 story, 45x100 ft., brick storage bldg., Eastern Ave., to Nathan Seltzelman, 196 Poplar St. H. Selsnick, 439 Bway., archt.

Mass., Worcester—WAREHOUSE, etc.—Wyman Gordon Co., 105 Madison St., 1 story, 62x98 ft., brick; storage warehouse and shipping facilities, to J. W. Bishop Co., 109 Foster St. CD 9/24—ENR 10/1.

Mass., Wrentham—FACTORY—Winter Bros. Co., Kendrick St., 2 story, 110x125 ft., rein.-con. factory addn., to Walter H. Barker, Inc., 23 Main St., Taunton. **Est. $125,000.**

Minn., Belle Plaine—PLANT—Minnesota Valley Milk Processing Cooperative Assn., general contract 2 story, 74x75 ft. dehydrating plant, 1 story, 46x74 ft. warehouse, to Opitz & Boehl, St. Cloud, about **$40,000.** CD 9/9—ENR 9/17.

Minn., Brainerd—PLANT—Land O' Lakes Dairy Co., 2201 Kennedy St. N.E., Minneapolis, general contract 1 and 2 story milk dehydrating plant, garage and warehouse, brick, to J. B. Nordenstrom, Mora, about **$51,000.** CD 10/28—ENR 11/12.

Minn., St. Paul—FACTORY—Auto Engine Works, J. D. Mooney, pres., 349 Hamline Ave. N., general contract brick factory addn., to Madsen Constr. Co., 1790 Lyndale Ave. S., Minneapolis, **$80,000;** wiring, to Commonwealth Electric Co., 417 Bway. Larson & McLaren, 1901 Foshay Tower, Minneapolis, archts.

Mo., St. Louis — ABATTOIR — American Packing Co., 3842 Garfield Ave., remodeling abattoir, 3833 Cote Brilliante Ave., to Woermann Constr. Co., 3800 West Pine Blvd. Est. **$40,000,** incl. equip. CD 10/29—ENR 10/5.

New Jersey—PLANT—Wm. Slack & Son, archts., 1401 W. State St., Trenton, 1 story, 80x184 ft., concrete plant, for Industrial Company, to John W. Ferguson Co., Inc., 152 Market St., Paterson, **$75,000** plus. CD 11/9—ENR 11/12.

N. J., Lyndhurst—BOILER PLANT—Leslie Co., Grant Ave., boiler plant, to Child & Scott-Donohue, Inc., 153 E. 38 St., New York, N. Y., **$40,000.** Bids 10/19. CD 10/9—ENR 10/15.

O., Canton — FACTORY — Hercules Motors Corp., Market Ave. S., two 2 story, brick, steel concrete factory bldgs., incl. machine shop, warehouse, etc., to Melbourne Bros. Constr. Co., Mellett Bldg., **$150,000.** Awarded 11/5.

O., Cleveland—FACTORY—Cleveland Steel Barrel Co., J. M. Finney, pres., 9612 Meech Ave., factory addn., to Bolton-Pratt Co., 1276 W. 3 St. Est. **$40,000.** CD 1/28—ENR 11/5.

O., Tiffin—PLANT—Tiffin Art Metal Co., Tiffin, rebuilding plant, to Thos. L. Hickey, Inc., 121 N. Hill St., South Bend, Ind., over **$100,000.** Awarded 11/2.

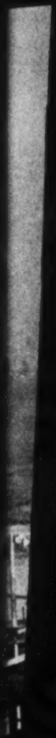
Tex., San Carlos (near Edinburg)—PLANT—Miller Bros. Food Co., San Carlos, vegetable dehydration plant and new flash-freeze plant, force account. **$62,500.** CD 11/10—ENR 11/12.

Wis., Green Bay—FACTORY—Green Bay Box Co., 1406 S. Bway., 1 story, 50x90 ft., concrete block factory addn., concrete fdn., to Selmer Co., 204 Northern Bldg. H. W. Williams, Northern Bldg., archt.

Wis., Waukesha — FOUNDRY — Waukesha Foundry Co., Lincoln Ave., 1 story, 60x200 ft., concrete block, brick foundry addn., concrete fdn., day labor. Electrical work by owner. R. H. Bierman, 3402 W. Thurston Ave., archt.

F

N

nker